505.42
.N29

THE

NATURAL HISTORY REVIEW:

Published Quarterly:

INCLUDING

THE PROCEEDINGS

OF

THE IRISH NATURAL HISTORY SOCIETIES

FOR THE SESSIONS 1855-56.

VOL. III.

SMITHSONIAN INSTITUTION
NOV 19 1934
237628
NATIONAL MUSEUM

LONDON:
WILLIAMS AND NORGATE,
14, HENRIETTA-STREET, COVENT GARDEN.
EDINBURGH: WILLIAMS AND NORGATE.
DUBLIN: HODGES, SMITH, AND CO.
1856.
PRICE TWELVE SHILLINGS.

505.42
N29

INDEX TO REVIEWS.

	Page.
Baker's Flowering Plants and Ferns of Great Britain	19
Adams, Shells and their Inhabitants	48
Burmeister's Manual of Entomology	57
Burmeister's Wingtypes of the Coleoptera	1
Catlow's Popular British Entomology	21
Dallas' Natural History of the Animal Kingdom	45
Dawson and Clark, Nomenclature of British Geodephaga, &c.	52
Douglas' World of Insects	53
Entomologists' Annual for 1856	16
Gosse's Handbook to the Marine Aquarium	29
Hinrichs' Life in Nature	33
Johnson's British Poisonous Plants	101
Kirby and Spence's Introduction to Entomology, Seventh edition	50
Kingsley's Glaucus, or Wonders of the Shore	5
Landsborough's Popular History of British Zoophytes	21
Lawson's Structure of Victoria Regia	38
Lindsay's Dyeing Properties of Lichens	18
Lindsay's Popular History of British Lichens	65
March Winds and April Showers. By Acheta	27
May Flowers. By Acheta	27
Miscellaneous Notices	38
Motley and Dillwyn's Contributions to the Natural History of Labuan and Borneo	30
Popular Geography of Plants. By E. M. C. Edited by Chas. Daubeny	63
Seeman's Popular History of Palms and their Allies	39
Shield's Practical Hints respecting Moths and Butterflies	53
Sowerby's Ferns of Great Britain	101
Sowerby's Fern Allies	15, 101
Sowerby's Popular British Conchology	21
Stainton's Entomologists Annual for 1856	16
Stainton's June : a Book for the Country in Summer time	46
Stainton's Manual of British Butterflies and Moths	98
Stainton's Natural History of the Tineina	9
Stenhammar, Copromyzinæ Scandinaviæ	32
Taylor's Geology, its Facts and Fictions	18
Thompson's Natural History of Ireland	60
Walker's Insecta Britannica Diptera	67
White's Popular History of Birds	21
Wollaston's Variation of Species	43
Zetterstedt, Diptera Scandinaviæ	33

Errata.

REVIEWS—

Page 15, line 4, *for* scitalla, *read* scitella.
,, 34, ,, 21, and elsewhere, *for* Hinrich, *read* Hinrichs.
,, 44, ,, 14, *for* distribution, *read* distinction.
,, 48, ,, 5, ,, plain ,, coloured.
,, 82, ,, 6 from foot, *for* seven *read* eight.

PROCEEDINGS OF SOCIETIES—

Page 10, line 35, *for* Lutreille, *read* Latreille.
,, 12, ,, 4, ,, Ductoria, ,, Suctoria.
,, 12, last line ,, Diperta, ,, Diptera.
,, 13, ,, 33 ,, epipharynx ,, hypopharynx.
,, 16, ,, 4 from foot, *for* tetraumera, *read* tetramera.
,, 20, ,, 12 *for* OCHTHEBUIS, *read* OCHTHEBIUS.
,, 23, ,, 41 ,, sinnate, ,, sinuate.
,, 72, ,, 31 ,, fornicatus ,, pumicatus.
,, 73, ,, 1 ,, tricolor ,, bicolor.
,, 74, ,, 6 from foot, *for* Biza *read* Briza.

NOTICES OF SERIALS—

Page 2, line 47, *after* 213, *insert* GEOLOGY, etc.
,, 9, ,, 4 from foot, *for* p. 138-663, *read* p. 138-154. (Same.) On the Neuration of the leaves of the Papilionaceæ; with 22 plates; p. 600-663.
,, 10 ,, 47, *for* 109, *read* 309.
,, 10 ,, 48, ,, 205 ,, 295.
,, 10 ,, 5 from foot, *for* Schrotter (Occurrence), *read* (Schrotter) Occurrence.
,, 11 ,, 40 *for* Granwacke, *read* Grauwacke.
,, 12 ,, 4 ,, p. 146 ,, pp. 146.
,, 13, last line, *for* Chemistry, *read* Chemnitz.
,, 15 line 21 ,, *Alcedo-ispida* ,, *Alcedo ispida*.
,, 16 ,, 21 ,, 40, ,, 30.
,, 25 ,, 25 ,, Botany by Griesbach, p. 289, *read* Lower Animals, by Leuckaert—p. 289-306; Vermes—p. 306-340; Turbellarii—p. 340-357; Rotifera—p. 357-364; Bryozoa—p. 364-373; Echinodermata—p. 373, 404; Coelenterata—p. 404-471; Porifera—p. 471-473.
,, 18 ,, 5 from foot, *after* plate, *insert* p. 191-200.
,, 18 ,, 4 ,, *for* Jorel, *read* Jord.
,, 21 ,, 10 ,, ,, 239 ,, 339.
,, 23 ,, 22 *dele* ANNULATA.
,, 23 ,, 24 & 25 from foot, *for* when, *read* until.
,, 24 ,, 14 *for* 257-350, *read* 357-370.
,, 28 ,, 10 from foot, *after* glass, *for* comma, *read* a semicolon.
,, 37 ,, 18 *for* 1854, *read* 1855.
,, 45 ,, 27 ,, connected, *read* connecting.
,, 49 ,, 26 *after* New York, *insert* Vol. xxi.
,, 54 ,, 9, *for* 161, *read* 261.
,, 55 ,, 3, ,, Magnelite, *read* Magnesite.
,, 63 ,, 6 from foot *for* iv. ,, vi.
,, 66 ,, 2, 3, 4, ,, E. ,, Z.
,, 69 ,, 15 from foot ,, phosphorence *read* phosphorescence.
,, 74 ,, 26 ,, Gallulidæ ,, Galbulidæ.
,, ,, ,, 28 ,, Girand ,, Giraud.

INDEX TO PROCEEDINGS—

Page iii., line 23, *for* Aspsenium, *read* Asplenium.
,, vii. ,, 7, *for* weeds, *read* breeds.

Besides some obvious minor Typographical errors.

THE

NATURAL HISTORY REVIEW.

Reviews.

UNTERSUCHUNGEN UEBER DIE FLUEGEL-TYPEN DER COLEOPTEREN, von Prof. Dr. H. Burmeister. (Part I. Clavicornia, with a plate.) 4to. Halle. 1855.

WINGS may be considered characteristic of insects among the Annulata, no less than of birds among the Vertebrata, although this character be neither strictly universal in the former, nor exclusively confined to the latter class. The earliest arrangement of the Annulata which has come down to us—that of Aristotle—is based upon these organs; and they have continued to hold either the first, or a nearly co-ordinate place, in most of the modern systems of Entomology, the differences in their number and texture chiefly being regarded in the characters of the orders. Frisch* was the first who looked for generic distinctions in the disposition of the horny veins which, acted on by muscles contained in the thorax, move the membrane, kept by them in a state of tension. Moses Harris next applied the principle to the classification of the Diptera, and a part of the Hymenoptera, which he illustrated by numerous and accurate figures.† After him, Jurine more fully and methodically elaborated the genera of Hymenoptera on like grounds, adding a scheme of nomenclature for the veins, the basis of that now in common use.‡ The great significance of the characters thence derived is now universally admitted, as regards these two orders, which combine evidence, precision, simplicity, and variety in the venation. But in the remaining orders, where one or other of these conditions for the most part undergoes a degradation, the use of such a help for classification was more tardy, or remains yet incomplete. This has been the case more

* Beschreibungen von all. Insekten u. s. w. Berlin. 1720.
† Exposition of English Insects. London. 1776.
‡ Nouvelle Methode de classer les Hyménoptères, etc. Genève. 1807.

especially with the Coleoptera, inasmuch as the usually concealed position of their membranous underwings impeded the consideration of them in this point of view. Preyssler, indeed, early urged the utility of the veins for the classification of all the orders, and of the Coleoptera in particular, adducing specific examples from among the *Scarabæi*.* Neither has this character been overlooked by Sturm or Guerin, in their figures illustrating the genera of that order. More lately, Matzek,† insisting on the same theme, has proposed a special nomenclature for the veins and areolets in the underwings of the Coleoptera; while Heer has investigated most particularly the variations in the manner of their folding, in relation to the different families.‡ The tract which we have under review, however, is likely to contribute, more than any of those previous essays, to the general application of the principle among the Coleoptera, albeit restricted in its immediate scope to a single group. Burmeister, having sought in vain to find comprehensive characters, for the great groups of this order, in the antennæ, mouth, feet, and abdomen, was induced to turn his attention to the veining of the wings. The first fruits of this study appeared in an essay on the natural affinities of the *Paussidæ*,§ which family, upon this and other grounds, he referred to the neighbourhood of the *Carabidæ*. So novel a suggestion naturally elicited some criticism, and the general views he had put forth on the value of the characters derived from the wings received a separate share of discussion. The objection, which had been anticipated and briefly repelled by Preyssler, arising out of the want of wings in many Coleoptera, was restated by Erichson in a form more precise, and with a fairer appreciation of its force and tendency. "There are," he observes, "two circumstances which render the venation of but secondary moment; 1st, that the membranous wings are sometimes wanting in individuals, sex, or species, in genera, or even whole sections and families of Coleoptera; 2nd, that the majority of minute forms, of whatever family, have the wings veinless. Still, the variations in the veining of the underwings of the Coleoptera deserve more attention than they have yet obtained, especially in relation to the different modes in which they are folded up under the elytra."‖ This latter consideration, as we have seen, has been since very fully elucidated by Heer. Burmeister, however, will concede to this but a subordinate place, as at most a generic, sometimes

* Illigers Magazin für Insekten-kunde. Bd. 2, Braunschweig. 1802.
† Necrophororum Monographiæ. Part I. Breslau. 1839.
‡ Entomologische Zeitung. Bd. 4. Stettin. 1843.
§ Guèrin, Magazin de Zoologie. An. 1841.
‖ Wiegmanns Archiv für Naturgeschichte. Bd. 2. 1842.

merely a specific character. Of the general argument he disposes in these terms:—"It is true that many of the Coleoptera are apterous, but the objection therefore taken originates in a very contracted point of view, and is immaterial. When any stirps—the *Melanosomata*, for example—is destitute of wings throughout, that very circumstance affords a character derived from the wings, namely, the want of them.* On the other hand, when individual genera, or even whole families, as the *Scydmænidæ* and *Pselaphidæ*,† are wingless; the rest of their structure will sufficiently determine their natural affinity." So that, in his opinion, no greater difficulty should result therefrom than in the other orders, in which the venation, admitted as an important character in general, does not, however, leave us at a loss where to place the apterous forms, of which there are examples enow in those orders also. The practical difficulty lies rather in the comparative indistinctness of the veins in the Coleoptera, and in this, that they are not connected in one complete system, but *normally* interrupted in a tract corresponding to the primary fold of the wing.‡ Burmeister, contemplating a more extended treatment of the subject in parts to follow, has devoted this one mainly to the great and multiform group *Clavicornia* of Latreille. The views he has promulgated claim a careful consideration, whether we regard the weight of the writer's authority, the additional element here introduced for the solution of the problem, or the results as they affect certain erratic forms and much-vexed questions of affinity. We have, therefore, judged it not out of place to give a summary of the arrangement that Burmeister has proposed. But to explain his method, and to prevent misconception, it seems well to premise the author's concluding aphorism—that the wings, by themselves, cannot establish any stirps; but the groups thus indicated are only then to be admitted as natural, when other characters coincide with this one. Accordingly, the form of larva, the special composition of the thorax and abdomen, the oral organs, and the tarsi, all have been consulted as carefully as the wings; but

* The simplified venation of the minuter forms is hardly a more specious objection. Restricted to individual species, the statement scarcely holds good; and if it did, would not amount to a serious difficulty. No more can it constitute such in respect to groups and families wholly consisting of such minute forms, since here absolute magnitude and simpler venation may be considered as at once characteristic and correlative.

† In this instance we can only recognise an oversight, or hasty induction. Most collectors probably know that it is nothing uncommon to take *Euplecti* on the wing.

‡ This incomplete continuity and imperfect tubular structure of the veins in the Coleoptera may account for the slighter cohesion between the contiguous membranes of the wing. We have often observed the wings of small beetles, preserved in a fluid medium, reduced, by absorption or imbibition of the fluid, to their genetical condition of a membranous sac.

the characters drawn from the last alone are exhibited in this essay, such a prominence appearing conducive to the end in view.

Among the *Clavicornia* of Latreille, Burmeister discriminates three great groups, in his opinion co-ordinate with such stirpes as the *Lamellicornia*, *Capricornia*, *Rhynchophora*, and *Cyclica*. The name CLAVICORNIA is reserved for the first of these, consisting of the HISTEROIDEA, NECROPHORIDÆ (Silphidæ, restricted as follows), SCAPHIDIINA, CELERIPEDIA (Catops, Colon), ANISOTOMIDÆ; and as another section, the BRACHYPTERA (Staphylinidæ), PSELAPHIDÆ, and SCYDMÆNIDÆ. The CRYPTOPHAGIDÆ, NITIDULINA, and PHALACRIDÆ appear to form a connecting link, more closely allied to the *Clavicornia*, but also leading, by means of *Rhizophagus** and *Megalognathus*,† to the PILICORNIA. This, the second stirps, is composed of the DERMESTODEA (Limnichus and Aspidiphorus being detached), BYRRHODEA (including Limnichus), PELTODEA (Peltis, Thymalus), TROGOSITIDÆ (Trogosita, Gymnochila, Temnochila, Nemosoma), ENGYIDÆ (Engys,‡ Dacne, Mycotretus, Tritoma, Triplax, Byturus,§ Languria), EROTYLIDÆ, MYCETOPHAGIDÆ (Mycetophagus, Diphyllus, Triphyllus, Tetratoma), COLYDIIDÆ (Synchyta, Colobicus, Ditoma, Colydium), and CORTICIDÆ (Corticus, Sarrotrium, Acropis). The last two groups that Latreille has comprehended in the *Clavicornia* are so intimately allied to his *Palpicornia*, that they are here combined with the latter in the third stirps, PHILYDRINA Macleay, which then consists of the PALPICORNIA, MACRODACTYLI (Parnidæ, Elmidæ, Georyssidæ), and ACANTHOPODA (Heterocerus).

The place awarded in this scheme to the *Brachelytra* is likely enough

* According to Burmeister, *Rhizophagus* should be treated as the representative of a peculiar type of the *Nitidulina;* agreeing with the *Ipina* in the oral organs, but in respect to the antennæ, legs, and wings, differing from them yet more than from the rest of the family.

† *Megalognathus* (*Prostomis*) presents such peculiar characters as seem to forbid its conjunction with either the *Trogositidæ* or *Histeroidea*. Burmeister, therefore, refers it to a place between the *Trogositidæ* and *Peltodea*, in relation to which it stands as a probable connecting link with the *Platysomæ* through *Parandra*.

‡ We can discover no valid reason for the change of *Engis*, and its derivative *Engidæ*, into *Engys* and *Engyidæ*. A noun ἐγγύς is no more to be found in old Greek than ἔγγις; and even if we assume, as the author has probably done, the adverb εγγὺς for the root, a change of termination, in passing into the casual form, is not liable to the charge of inconsequence.

§ "*Byturus* agrees well with *Triplax* and *Tritoma* in the structure of the tarsi; the oral organs also correspond, with the exception of the securiform maxillary palpi, so that I have no hesitation in referring *Byturus* to this family. Even in general habit the resemblance is strong, although the pubescence of *Byturus* is in contrast with the glabrous surface of the *Engyidæ* in general. But when we are aware that in exotic genera, as *Episcapha*, there are pubescent and glabrous species in the closest contiguity (*e.g.*, *E. glabra* and *E. longicornis*), this difference ceases to seem material, and the relation of *Byturus* to the family *Engyidæ* appears established in every point of view."

to startle the majority of entomologists, accustomed to attribute a higher rank to that extensive group, in respect of the peculiar segmentation of the abdomen, and the wide range of variations which the composition of the tarsi undergoes, as well as the fore coxæ and the propleuræ. The definite conjunction, also, of the *Scydmænidæ* with that family and the *Pselaphidæ*, remains open to discussion, upon the data pre-existing, since the first fails to develope the new element of affinity which has been the cardinal motive of this essay. We leave our readers to form their own judgment of the proposed arrangement, contented with expressing our own conviction of the value of the comprehensive views to which these researches of Burmeister's tend.

GLAUCUS; OR, THE WONDERS OF THE SHORE. By Charles Kingsley, Author of WESTWARD HO! HYPATIA, &c. Second Edition, 12mo., pp. 165. Cambridge: Macmillan & Co. 1855. Price 3s. 6d.

"THE basis of this little book was an article which appeared in the 'North British Review' for November, 1854:" so we learn from a prefatory note. It is a very difficult thing to write a good review, more especially on subjects of a scientific nature: the review must not be too learned, or it will have too few readers; it must not betray ignorance of the subject by the writer, or it is simply useless. "Glaucus," if considered as a review, shares both these faults; it is much too learned, and at the same time reveals to us an alarming extent of ignorance in the writer on the subject of natural history.

Yet, few works published during the past year have been more read than "Glaucus;" go where you will, talk to whom you will, every one has seen "Glaucus," and speaks approvingly of it; some, indeed, suggest, that it would have been better "if so and so had been omitted," or object to a passage in this page or a sentence in that; but, taken as a whole, it is very seldom that a work receives so cordial a welcome.

Now, what is the secret of this success? Mr. Kingsley had acquired fame as a writer on other topics before he touched upon natural history; and though apparently very ignorant of this latter subject, still he brought all the trained skill of the author, and all the weight of a pen of no mean calibre, to bear upon the topic he chose to advocate. Imagine the excitement that would be caused if Macaulay or Dickens were to bring out a book on natural history; all the world would read it, to see what *they* could have to say on the subject; and we presume it has been with much the same motive that all the world has read Kingsley's "Glaucus."

The object of the book is to encourage a taste for natural history; and the introductory portion of it is so well written that we defy any naturalist to read it without feeling his soul stirred within him; the opening pages at once arrest the attention.

"You are going down, perhaps, by railway, to pass your usual six weeks at some watering-place along the coast, and, as you roll along, think more than once, and that not over cheerfully, of what you shall do when you get there. You are half-tired, half-ashamed of making one more in the 'ignoble army of idlers' who saunter about the cliffs, and sands, and quays; to whom every wharf is but a 'wharf of Lethe,' by which they rot, 'dull as the oozy weeds.' You foreknow your doom by sad experience. A great deal of dressing, a lounge in the club-room, a stare out at the window with the telescope, an attempt to take a bad sketch, a walk up one parade and down another; interminable reading of the silliest of novels, over which you fall asleep on a bench in the sun, and probably have your umbrella stolen; a purposeless fine-weather sail in a yacht, accompanied by ineffectual attempts to catch a mackerel, and the consumption of many cigars; while your boys deafen your ears, and endanger your personal safety, by blazing away at innocent gulls and willocks, who go off to die slowly—a sport which you feel in your heart to be wanton, and cowardly, and cruel, and yet cannot find in your heart to stop, because 'the lads have nothing else to do, and, at all events, it keeps them out of the billiard-room;' and after all, and worst of all, at night a soulless *rechauffé* of third-rate London frivolity. This is the life-in-death in which thousands spend the golden weeks of summer, and in which you confess with a sigh that you are going to spend them."

Here, though the sentences run on glibly, and are lightly and pleasantly written, a serious vein of earnestness pervades the whole, and the idler cannot but see that the question is put to him—"To what purpose does he live?" The answer to which, if correctly given, would, we fear, be no other than—"To pass the time."

Again we quote Mr. Kingsley, at page 6:—

"We shall agree, at least, that the study of natural history has become now-a-days an honourable one. A Cromarty stone-mason is now, perhaps, the most important man in the city of Edinburgh, by dint of a work on fossil fishes; and the successful investigator of the minutest animals takes place unquestioned among men of genius, and, like the philosopher of old Greece, is considered, by virtue of his science, fit company for dukes and princes. Nay, the study is now more than honourable; it is (what to many readers will be a far higher recommendation) even fashionable. Every well-educated person is eager to know something, at least, of the wonderful organic forms which surround him in every sunbeam and every pebble; and books of natural history are finding their way, more and more, into drawing-rooms and school-rooms, and exciting greater thirst for a knowledge which, even twenty years ago, was considered superfluous to all but the professional student."

This, if true, and we believe that it comes very near the truth, may be productive of evil. If natural history become fashionable, it will be pursued for fashion's sake by those who have no love of it; a demand for books on natural history will arise, to supply which all sorts of "got up" publications will appear; books written like this of Mr. Kingsley's, by those who are no naturalists, and who will probably garble or distort the observations

of others, or write random nonsense of their own. To obviate such a result it is incumbent on each naturalist who foresees the coming demand, and who has the facility of writing sterling works, to put his shoulder manfully to the wheel; that is, to take the pen in his hand, so that if books are wanted, books may be had, without having recourse to the aid of scissors and paste to generate them.

It may well be doubted whether any book has appeared for years past which has done more to promote the study of natural history than the little book we have now under consideration will certainly do, and we think it rather discreditable to the naturalists of the present day that they should allow such laurels to be gathered in their own domain by a perfect stranger. We fear that each naturalist has been too much bent on prosecuting in his closet his own particular branch of natural history, and has neglected to disseminate amongst others the pleasures he himself has been enjoying. The professors are too apt to leave the *popularizing* of their studies to other and less competent hands.

In the following passage, pp. 24–27, we see in juxtaposition the ignorance we have already remarked upon, as well as an excellently graphic account of the pleasure of meeting, in one's foreign travels, new plants and animals:—

"Ask yourself seriously, 'What branch of natural history shall I begin to investigate, if it be but for a few weeks, this summer?'

"To which I answer, 'Try "the Wonders of the Shore."' There are, along every sea-beach, more strange things to be seen, and those to be seen easily, than in any other field of observation which you will find in these islands. And on the shore only will you have the enjoyment of finding new species, of adding your mite to the treasures of science.

"For not only the English ferns, but the natural history of all our land species, are now well nigh exhausted."

This is perfect news to us, and we fear Mr. Kingsley must have been dreaming of some *El Dorado*, not like those mentioned in "Westward Ho!" where the people revelled in gold, but some paradise, where all the people were naturalists, which is certainly not the case in England. Mr. Kingsley continues—"Our home botanists, entomologists, and ornithologists are spending their time now, perforce, in verifying a few obscure species, and bemoaning themselves, like Alexander, that there are no more worlds left to conquer. For the geologist, indeed, especially in the remoter districts, much remains to be done, but only at a heavy outlay of time, labour, and study; and the dilettante (and it is for dilettanti, like myself, that I principally write) must be content to tread in the tracks of greater men who have preceded him, and accept at second and third hands their foregone conclusions."

"But this," adds Mr. Kingsley, "is most unsatisfactory." If by *this* he means the preceding paragraph, we believe all naturalists will cordially agree with him. *It is most unsatisfactory*, because it might deter many a young hand from attempting some branch of study which is much in want of students, from the idea that the subject had been worked bare, and was "well nigh exhausted." The remainder of the passage we can heartily recommend:—

"For in giving up discovery, one gives up one of the highest enjoyments of natural history. There is a mysterious delight in the discovery of a new species, akin to that of seeing for the first time, in their native haunts, plants or animals of which one has till then only read. Some, surely, who read these pages have experienced that latter delight; and though they may find it hard to define whence the pleasure arose, know well that it was a solid pleasure, the memory of which they would not give up for hard cash. Some, surely, can recollect, at their first sight of the Alpine soldanella, the rhododendron, or the black orchis, growing upon the edge of the eternal snow, a thrill of emotion, not unmixed with awe—a sense that they were, as it were, brought face to face with the creatures of another world; that nature was independent of them, not merely they of her; that trees were not merely made to build their houses, or herbs to feed their cattle; as they looked on those wild gardens, amid the wreaths of the untrodden snow, which had lifted their gay flowers to the sun year after year since the foundation of the world, taking no heed of man, and all the coil which he keeps in the valleys far below.

"And even, to take a simpler instance, there are those who will excuse, or even approve, of a writer for saying that, among the memories of a month's eventful tour, those which stand out as beacon-points, those round which all the others group themselves, are the first wolf-track by the roadside in the Kyllwold; the first sight of the blue and green roller-birds, walking behind the plough, like rooks, in the tobacco-fields of Wittlich; the first ball of olivine scraped out of the volcanic slag-heaps of the Dreisser-Weiher; the first pair of the lesser bustard which we flushed upon the downs of the Mosel-kopf; the first sight of the cloud of white ephemera, fluttering in the dusk, like a summer snow storm, between us and the black cliffs of the Rheinstein, while the broad Rhine beneath flashed blood-red in the blaze of the lightning and the fires of the Mausenthurm—a lurid Acheron, above which seemed to hover ten thousand unburied ghosts; and last, but not least, on the lip of the east Mosel-kopf crater, just above the point where the weight of the fiery lake has burst the side of the great slag-cup, and rushed forth between two cliffs of clinkstone across the downs, in a changing stream of fire, damming up rivulets, and blasting its path through forests, far away towards the valley of the Moselle, the sight of an object, for which was forgotten for the moment that battle-field of the Titans at our feet, and all the glorious panorama, Hundsruch and Taunus, Siebengebirge and Ardennes, and all the crater-peaks around, and which was—smile not, reader—our first yellow foxglove!"

The following extract from the description of what a perfect naturalist should be (pp. 40–43) will be read with interest by all our readers; and with it we conclude this notice, which has already run to a length we little anticipated when we first sat down to our desk:—

"He must be of a reverent turn of mind also; not rashly discrediting any reports, however vague and fragmentary; giving men credit always for some germ of truth, and giving nature credit for an inexhaustible fertility and variety, which will keep him his life long always reverent, yet never superstitious; wondering at the commonest, but not surprised by the most strange; free from the idol of size and sensuous loveliness; able to see grandeur in the minutest objects, beauty in the most ungainly; estimating each thing not casually, as the vulgar do, by its

size or its pleasantness to the senses, but spiritually, by the amount of Divine thought revealed to him therein; holding every phenomenon worth noting down; believing that every pebble holds a treasure, every bud a revelation; making it a point of conscience to pass over nothing through laziness or hastiness, lest the vision, once offered and despised, should be withdrawn; and looking at every object as if he were never to behold it again.

"Moreover, he must keep himself free from all those perturbations of mind which not only weaken energy, but darken and confuse the inductive faculty; from haste and laziness, from melancholy, testiness, and pride, and all the passions which make men see only what they wish to see. Of solemn and unscrupulous reverence for truth; of the habit of mind which regards each fact and discovery not as our own possession, but as the possession of its Creator, independent of us, our tastes, our needs, or our vain glory, we hardly need to speak; for it is the very essence of a naturalist's faculty, the very tenure of his existence; and without truthfulness, science would be as impossible now as chivalry would have been of old.

"And last, but not least, the perfect naturalist should have in him the very essence of true chivalry—namely, self-devotion; the desire to advance, not himself and his own fame or wealth, but knowledge and mankind. He should have this great virtue, and in spite of many shortcomings (for what man is there who liveth and sinneth not?) naturalists, as a class, have it to a degree which makes them stand out most honourably in the midst of a self-seeking and mammonite generation, inclined to value everything by its money price, its private utility. The spirit which gives freely, because it knows that it has received freely; which communicates knowledge without hope of reward, without jealousy and mean rivalry, to fellow-students and to the world; which is content to delve and toil comparatively unknown, that from its obscure and seemingly worthless results others may derive pleasure, and even build up great fortunes, and change the very face of cities and lands, by the practical use of some stray talisman which the poor student has invented in his laboratory: this is the spirit which is abroad among our scientific men, to a greater degree than it ever has been among any body of men, for many a century past; and it might well be copied by those who profess deeper purposes and a more exalted calling than the discovery of a new zoophyte, or the classification of a moorland crag.

"And it is these qualities, however imperfectly they may be realised in any individual instance, which make of scientific men, as a class, the wholesomest and pleasantest companions abroad, and at home the most blameless, simple, and cheerful in all domestic relations; men, for the most part, of manful heads, and yet of childlike hearts, who have turned to quiet study, in these late piping times of peace, an intellectual health and courage which might have made them, in more troublous times, capable of doing good service with very different instruments than the scalpel and the microscope.

"I have been sketching an ideal, but one which I seriously recommend to the consideration of all parents; for, though it be impossible and absurd to wish that every young man should grow up a naturalist by profession, yet this age offers no more wholesome training, both moral and intellectual, than that which is given by instilling into the young an early taste for outdoor physical science."

The Natural History of the Tineina. Vol. I. Containing Nepticula, Part I.; Cemiostoma, Part I. By H. T. Stainton, assisted by Professor Zeller and J. W. Douglas. London: John Van Voorst, Paternoster Row. Paris: Deyrolle, Rue de la Monnaie, 19. Berlin: E. S. Mittler und Sohn. Zimmerstrasse, 84-85. 1855.

In a former number we had the pleasure of noticing at some length the third volume of "Insecta Britannica, Lepidoptera Tineina," by this able

naturalist, and expressed our satisfaction at the promise of the work the first volume of which now lies before us. Our attention having been so recently called to the subject, coupled with the fact that we shall have abundant opportunities of returning to it from time to time, as fresh volumes make their appearance, it will be less necessary to be lengthy in our remarks now. In fact, this is the first instalment of a work the completion of which belongs to a period of perhaps almost fabulous futurity. "This is the first of a long series of volumes," says Mr. Stainton in his preface; and, as a significant comment on the announcement, we are told "the subscription list to the first ten volumes is now closed. Due notice will be given of the opening of the subscription list for the second series of ten volumes." "It is hoped that the progress of our discoveries will enable us annually to produce a volume," although it may be more than a year before volume 2 is ready, owing to the premature death of the very accomplished artist, Mr. Wing, and the consequent necessity for training another to the required pitch of entomological excellence. Onwards, then, for nineteen years at least, we may look as composedly as we can, and when the young naturalists among us shall be turning gray, and the veterans live only in memory, the subscription list for a third series of ten volumes may be just closing. It is a long work, truly; blessed are they who have much patience. Yet we have no right to complain. Whatever is worth doing at all, is worth doing well, and if twenty, thirty, or even forty years be needful to do this work, we would not wish to curtail the time by a single year. These little creatures are the work of Infinite Wisdom, and deserve in themselves more than superficial notice; for "the works of the LORD are great, *sought out* of all them that have pleasure therein." He "hath so done His marvellous works that they *ought* to be had in remembrance." And if Messrs. Stainton and Douglas, and Professor Zeller, are not spared to complete the work in their own persons, we cannot doubt that they who rise up after them, though to-day, perhaps, in the nursery, will be both able and anxious to continue a work so auspiciously and trustfully begun.

In one respect there is a material difference between this work and the one formerly reviewed by us. That was confined to the British Tineina; this includes all European species, and is apparently intended not more for the British entomologist than for the German, French, Swedish, and Italian, the co-operation of all of whom is solicited, in order to make the work more complete, and to provide for the continuous appearance of the volumes, while, to render it an European work in its fullest sense, the letterpress is given in four languages, English, French, German, and Latin, so that it would be difficult to find a civilised and educated European to whom this

need be a sealed book. The comprehensiveness of the plan deserves warm praise, but we wish the list of subscribers had borne better testimony to the due appreciation of the friendly care for foreigners, who are there represented by the solitary name of Senator Von Heyden of Frankfort. May we not hope that the others have been too grateful for what has been done for them to avail themselves of the almost comically low price at which the first ten volumes are to be issued to subscribers, 7s. 6d. each volume, and that the same feelings may have operated widely at home? Mr. Stainton naively remarks: "It is not published at a remunerative price." We believe him: eight beautiful plates, at less than one shilling per plate, and the letterpress gratis. That is the way subscribers are treated; for which they one and all owe the author a salaam of eastern magnificence. "The price," he says, "is regulated solely by the cost of colouring the plates: so that were the letterpress only in a single language, or altogether wanting, the price would be the same." Commend us, therefore, to Mr. Stainton. One more tribute to his liberality, and we turn to other matters. In order to encourage communications elucidating the transformations of the species of Tineina, so many of which are at present unknown, he offers "to present to every one who shall first discover and communicate to him the transformations of twenty species with which he was previously unacquainted a copy of the entire series of this work." Possibly but few may thus earn the prize; but still for so generous an offer we again say, commend us to Mr. Stainton.

In the opening of his preface the author takes occasion to remark on the two classes into which, as he justly says, entomologists have been too long divided, collectors and observers. While expressing a hope that his present undertaking may prove of service to both these classes, he evidently accords the palm of merit to the latter of them, whom, taking Reaumur and De Geer as its types, he defends against the complaint of the collectors that their labours are comparatively useless, because we are "unable to determine to which of our named species their observations apply. The *observant* entomologist," he adds, "makes no such complaint, *he* finds that the history of the entire habits and transformations of a species assists him far more essentially to determine the name of the insect than a description solely of the perfect insect." Entirely concurring in the preference accorded to the mere observer over the mere collector, we do not think that our author has given full weight to the objection which he mentions. There is, if we mistake not, more sense in it than he is willing to allow. It is true that the description *solely* of the perfect insect may at times be scarcely sufficient to determine its specific name; it is true, also, that if to this descrip-

tion be added the history of its habits and transformations, the task may be much simplified, *provided always* that the inquirer be previously aware, from independent sources, whether his own observation or the knowledge of the result of the observation of others, that such and such a distinctly named species accurately accords in its habits and transformations with the anonymous insect described by the original observer. If he does not know this, it is clear to demonstration that, in spite of these elaborate observations and "histories," he is not one whit nearer the identification of the species than he was before. It is equally clear that a repetition of all these observations, by himself or others, is the only means of acquiring this knowledge; that is to say, that *for the purpose of identification of species* these anonymous observations are useless till repeated, *i.e.*, by themselves they are of no use at all; when repeated, and so found exactly applicable to an insect whose name is known, they serve both as confirmation of the accuracy of the later investigations, and as monuments of the skill and perseverance of the former observer. Indeed, it may often happen that the first observations may be more minute and accurate than the later ones, and so may serve as guides to more perfect research. We cannot dispense with them; we may gladly raise them far above the mere collectors of specimens; but we think Mr. Stainton's zeal has carried him rather beyond the limits of logical argument. We believe his advice would be, and we should heartily second it—Let each entomologist try to be both collector and observer; for in the union of both is the surest prospect of scientific eminence.

The present volume contains the first part of the two genera, Nepticula and Cemiostoma, with figures and descriptions of twenty-one British species of the former, and three of the latter. We have no intention of entering into minutiæ on the occasion; we will only point out the mode of treatment adopted by Mr. Stainton, which is almost exhaustive. We have copious observations on the general character of the genus, in the larva, pupa, and imago; the habits of the larva and imago; the number of species; a synopsis of all the species at present known, and of the larvæ hitherto observed, which are classed according to the natural order of the plants on which they feed; then follows a history of the study of the genus, which concludes the general observations. Then, taking the genus species by species, we have information as to how the larva and imago are noticeable; the mode of life in all its preparatory states; a description of the imago and of the larva; geographical distribution; the synonymy; remarks on the synonymy; and, finally, observations of authors on the insect. When to all this are added admirable figures of the imago and

larva, of the mines of the larva in the leaves of the plants it feeds on, and, in most cases, of the cocoon also, it would be difficult to name any desideratum. A work so conducted well merits its title, "The Natural History of the Tineina." We do not know any group of insects which will have received so thorough and systematic an investigation, when the last volume shall have been issued, and the work pronounced complete. *When?* That is a question, to be sure; but we can now examine the first foot-print on the highway to knowledge, and, *ex pede Herculem*, we are not much afraid of that stalwart form fainting half-way. There is a deliberate earnestness about it which is the best augury of success.

We have said that we do not mean to trouble our readers with many details, and we mean to keep our promise; but as but two genera are noticed in this first volume, we may be allowed to advert to one or two of the more striking characteristics of each. The genus Nepticula is said to contain the smallest known Lepidoptera, the "prize dwarf" being N. microtheriella, or "little wild beastie," the expanse of its wings being only $1\frac{3}{4}$ lines. The irony of blending any derivative of θηριον, however modified, with the name of so innocuous a creature, is surely too bitter to be deserved! Poor little thing, it might be expected to die of fright if it could but hear the name with which it is dignified among men. It could be wished that nomenclature were occasionally a trifle less preposterous. However, the thing is done past mending, and Nepticula microtheriella is the name irrevocable of the smallest known Lepidopterous atom.

The rough head and face, and folded palpi, and the shortness of the antennæ, rarely exceeding half the length of the anterior wings, are the most prominent characteristics of the imago of this genus, as the absence of true legs, and the unusual number of pro-legs, devoid of the coronet of little hooks, is the most distinguishing feature of the larva; while the pupa is remarkable for having "the parts of the future insect far more conspicuously displayed than is usual in the pupa of Lepidoptera. The Latin has—"Partes insecti magis fere exaratæ et separatæ sunt quam in ullo alio Lepidopterorum genere." The imago is famous for its swiftness of foot. We are tempted to quote the Latin again, on account of a certain quaintness of expression, which is almost irresistible when associated with the idea of a microtheriella in a hurry: "*Mira velocitate exigua talis bestiola currit*, licet brevibus pedibus prædita sit." Fancy less than the twelfth of an inch's length racing at express speed!

Of the thirty-three known species of this genus, only two—N. subnitidella and assimilella—have not yet been found in Britain; and their arrangement in groups is the same as that given in Ins. Brit. Lep. Tin.,

with the trifling difference that, in the present work, the two subdivisions of "anterior wings with two opposite pale spots and a broad local streak," and "anterior wings with three spots," have been united under the latter.

The palm is accorded to Haworth for the industry and ability displayed in investigating the history of this genus. For, with the exception of the transformation of N. assimilella, given by De Geer, and repeated by Goeze, nothing worth naming was known of the genus, till Haworth described ten species (including aurella, whose imago had been described by Fabricius), and six of his nine new species retain at the present day "the names he assigned to them." Mr. Stainton adds—"Haworth did not subdivide his Tinea into many genera, but places these in the section Metallicæ, and at the very end of it; a position to which, after various changes, they have again returned." After him, no one seems to have made any advance, before Zeller, in 1839, who described eight species, three unknown to Haworth; and, in 1848, he established the genus Nepticula, proposed by Von Heyden, enumerating thirteen species, three for the first time. The habits of the larva of three species are alluded to. Two or three great species were first established in Mr. Stainton's Syst. Cat. Brit. Tin. In 1851 Mr. Westwood gave a prodigious impulse to the study, by calling attention to the habit of the larva of anomalella of mining in rose leaves, exhibiting, at the same time, bred specimens. A *furor* seized the collectors, and by the end of 1853, when vol. 3 of Ins. Brit. was written, twenty-nine British species (very shortly increased by two) were described. So much for the fruits of entomological zeal rightly directed, in spite of Mr. Kingsley's foolish flourish about "no more worlds to conquer," &c. We fear he will never earn a presentation copy of this work; or if he has really, *in propria persona*, conquered all worlds entomological, let him write the history of his conquests, and convert many infidels.

We must omit further mention of individual species, except that we cannot fail to do homage to one special proof of Divine love and care for the least of his creatures, exhibited in the case of the larva of N. Censoriella and others; the more so as it has not been done by either Von Heyden, who first called attention to it, nor by Mr. Stainton in the present volume, nor in his Ins. Brit. Lep. Tin. We allude to the marvellous provision made for the food of such larvæ as are not full grown when the leaves of the trees on which they feed are fallen off and withered in autumn—viz., that the parts of the leaf around the abode of the larva remain green and fresh when all the rest of the leaf is dead, until, being full grown, the larva requires no more sustenance. Truly, His mercy is over *all* His works.

We must dispose of the genus Cemiostoma in six lines. Six species only are as yet known, half being indigenous to Britain, and contained in this volume. The genus is recognisable by the smooth head and face and the absence of palpi, one species, C. scitalla, having a few erect scales at the back of the head. In other respects they exhibit no very remarkable peculiarities, but their colours are beautiful, and the designs on the wings very neat. We esteem and admire them highly, but at present it must be in silence. And now, once more, rejoicing in this volume, in eager anticipation of those to follow, we say, Blessed are they who have much patience, for they shall be richly rewarded.

THE FERN ALLIES; a Supplement to THE FERNS OF GREAT BRITAIN. Illustrated by John E. Sowerby, Proprietor of Sowerby's English Botany. The Descriptions, Synonyms, &c., by Charles Johnson, Botanical Lecturer at Guy's Hospital. Published by the Proprietor, 3, Mead Place, Lambeth. 8vo., Parts 1 & 2. Five Plates each. Full coloured, 3s.; half coloured, 1s. 6d.

WE do not like, as a general rule, introducing to our readers' notice works which, however attractive, are published in a periodical form, and should much prefer waiting until the author's labours had been brought to a close, and then give him our opinion as to their result. The first few parts might be too good a specimen of the work as a whole; or the plates in the last few numbers might not be so carefully coloured; or the work might never be completed. But in introducing the above supplement to the British Ferns to our readers, we do so under the impression that the name of Sowerby is quite a sufficient guarantee against any such contingencies; and though we now merely draw their attention to this very beautiful work, purposing to return to it when complete, yet we feel confident that every part that is issued from the press will sustain the character for accuracy and beauty that attaches itself to the name of Sowerby. We give the Prospectus in full:

"The success that has attended the 'Ferns of Great Britain,' added to the expressed wishes of many of the subscribers to that work, has induced the proprietor to issue the present supplement, containing figures and descriptions of the so-called 'Fern Allies.' In thus doing, he trusts to deserve a continuance of the high opinion and support already accorded to the 'Ferns.'

"Though greatly differing in habit, the present plants are no less worthy of our admiration as natural objects; while the majority of them, especially the Equisetums and Lycopodiums, are ornamental, and amenable to cultivation under corresponding circumstances.

"The figures will be executed with equal care and accuracy, and the descriptions will include details of whatever of interest may attach to their individual history, as well as to their successful cultivation.

"The work will be completed in about six parts."

There are, we know, many who, though taking a great interest in "Fern culture," never think of growing any of the Equisetaceæ. Now, we would recommend such to take this work of Mr. Sowerby's; and on reading the very interesting histories given by Mr. Johnson (Mr. Sowerby's able coadjutor), we are sure they will be tempted to grow several of the species of Equisetum; and, if they do, we promise them that they will be amply repaid for all their trouble.

The Entomologists' Annual for MDCCCLVI. With a Coloured Plate. London: John Van Voorst, Paternoster-row. 1856. Price half-a crown.

It gives us much pleasure to be able, thus early, to introduce to our readers our promising contemporary, the Editor having, with more than punctuality, issued it on the 15th December. We have cast no careless glance over its contents, nor looked through its pages with the indifference of a *general* reviewer; neither have we retired to the gloomy recesses of a metropolitan house of business, there to jot down each point of special notice with the rigid austerity that would befit an East India merchant. No! But we have *read* the Annual, as we whirled through hills and dales, in a railway journey to a distant shire; and we have *considered* it in our lonely walk on a dusky, warm December afternoon, by still water-dykes and leafless hedgerows, when the Cheimatobiæ, and a few smaller moths yet unaffected by the cold, over and again flitted before or beside us, reviving all our summer propensity to seize the reluctant hat and imprison the unsuspecting insect. We shall give briefly but (it is hoped) pertinently the result of our musings.

A great advance has been made since the second edition of last year. The orders Coleoptera and Hymenoptera have received a fair proportion of attention; and many useful gleanings of information on various subjects have been added, some of which are from the pens of new contributors. The lists of British entomologists, and of entomological works, British and foreign, are calculated to be of great use; and we deem it right to mention that, through the Editor's diligent care, the consent of every single individual enumerated in the former was obtained before his name appeared in print. Much, however, as has been done to improve the Annual, there is still room for abundant exertion; albeit the form may be pretty well developed (to use the Editor's own expression), it does not seem to us by any means consolidated yet. There is a want of systematic distribu-

tion of the several parts. Mr. Lubbock's sensible remarks "on the objects of a collection" ought naturally to be appended to the introductory portion, where similar subjects are treated of; and Mr. Scott's account of Fochabers and its Lepidoptera ought not to be so disunited from the part of the book devoted to that order. Moreover, a little more "collusion" between the writers might be advantageous, as the same ideas under different forms of expression occur more than once. *En passant*, we quote a few lines from Mr. Scott's paper:—

"Happiness seemed to have her throne here—everything was so peaceful; and that strange sensation which creeps over every one who gets lost in his contemplation of the sublime was ever present—

'That undefined and mingled hum,
Voice of the desert, never dumb'—

stealing over all, now louder, now softer; and just as we think it dying away altogether, it bursts forth again with such a swell that he must indeed walk inconsiderately who does not listen in mute wonder. For yards round the tops of the trees we may hear and see the merry throng of gnats, they are so numerous. Then the grasshopper chirrups forth its part; some wandering bombus, too, sweeps by with deeper notes; and, deeper still, a stercorarius completes the harmony."

We would like to see such descriptions of nature a little more frequently.

The opening chapter, on the advantages of the study of natural history in general, would gratify us very much, did it not seem a little out of place in the *Entomologists'* Annual. But to the second chapter we most decidedly take exception. Here we find the old distinction of entomologists into collectors and observers again drawn out, with a comparison of their respective pleasures! Now, it is obvious that these two characters should be *united* in every entomologist, be the amount of time he bestows on the subject ever so small: why, then, not show the necessity for their union, and disavow, once for all, their claims for specific distinction?

The results of this year's acquisition have been somewhat remarkable. Lepidoptera appeared in most unusual numbers, and, among other novelties, were produced two new Sphinges (one of which is figured in the plate); of Hymenoptera there was a singular dearth; while Coleoptera continued much as usual.*

What may have been the condition of the other orders, the sectarian spirit of collecting but the favoured three as yet prevails too widely to permit us to do more than imagine; but we trust that many years will not elapse before a more liberal and extended view of created things will discover itself in the Entomologists' Annual.

* An error of inadvertence occurs in Mr. Janson's paper on Coleoptera, which ought to receive correction. He has several times had occasion to quote Mr. Haliday's papers read before the Dublin University Zoological Association, but in each case he has given the title as the Dublin "Natural History Society."

GEOLOGY: ITS FACTS AND FICTIONS; or the Modern Theories of Geology, contrasted with the Ancient Records of the Creation and the Deluge. By W. Elfe Taylor. Houlston and Stoneman, Paternoster-row. 1855.

THIS book does not properly come within our province as reviewers, since it deals rather with theological than geological questions. The author, by his own account, "was recently led to institute an inquiry into the conflicting claims of the Mosaic and geological records," of which inquiry the present work contains the results. Into this inquiry it is not our intention to follow Mr. Taylor, because we do not consider him qualified by his knowledge as a geologist to even appreciate the weight of geological evidence; and we think it is to be regretted that one so badly prepared by previous study of geological facts should have ventured into print upon so delicate a subject. Mr. Taylor's knowledge of geology, like his woodcuts, is derived from other men's books, and he has never prepared himself for his self-imposed task by personal observation in the field, nor does he appear to be acquainted with the branches of natural history, a knowledge of which is requisite in order to pronounce judgment on questions of geological science. We are not of those who consider there is any difficulty in reconciling the Mosaic and geological accounts of the creation of the world, and cannot, therefore, recommend to our readers what we consider to be a wrong-headed attempt to do so. Mr. Taylor's book, however, is not without its good points; his intentions are good; his paper and type, and his woodcuts—although not original—are, also, to be commended.

EXPERIMENTS ON THE DYEING PROPERTIES OF LICHENS. By W. Lander Lyndsay, M.D., Assistant Physician, Crichton Royal Institution, Dumfries. (From the "Edinburgh New Philosophical Journal" for October, 1854.)

WE have in this paper the tabulated results of between 500 and 600 experiments, made two or three years ago, by Dr. Lyndsay, whose chief object in making them was to call attention to the fact, that we possess in our own islands lichens capable of furnishing dyes, nearly, if not quite, equal in beauty to orchal, cudbear, and litmus.

This subject, says Dr. Lyndsay, is worthy of being followed out, by the manufacturer on the one hand and the chemist on the other.

1st, on account of its scientific interest; 2nd, with a view of further

developing the economic resources of our own country; 3rd, because the speculation—*i.e.*, the substitution of home for foreign dye-stuffs—promises to be remunerative, as the *rocellas* have frequently reached the high price of £1,000 per ton in the London market.

Dr. Lyndsay deserves our best thanks for the manner in which he has conducted these experiments, the result of which is given in twenty-four tables, attached to this pamphlet. If commanders of ships were aware of the value of these plants, which cover many a rocky coast and barren island, they might, with a slight expenditure of time and labour, bring home with them such a quantity of these insignificant-looking plants as would realize considerable sums to their own direct advantage, as well as that of the ship-owners, and, consequently, to the advantage of the State.

The Flowering Plants and Ferns of Great Britain; an attempt to classify them according to their Geognostic relations. By John Gilbert Baker. London: W. & F. G. Cash, 5, Bishopsgate-street Without. 1855.

In this pamphlet Mr. Baker developes, with much care, his views on a subject of the highest interest to the botanist, viz., the relations of the plant to the soil on which it grows. So far as his generalization extends, we are inclined to agree with him; but we believe that he has confined his attention too exclusively to the mechanical condition of the soil, and neglected other elements which, in our judgment, are of even greater importance, as influencing the growth of particular species of plants; we mean the chemical constitution of the soil, and the height above the sea level and aspect. We shall allow Mr. Baker to introduce his own theory in his own words:—

"With reference to the facility with which they yield to disintegration and to their hygroscopicity and porosity (*i. e.* lithologically) strata are essentially separable into two principal classes, *dysgeogenous* and *eugeogenous*.

"*Dysgeogenous* formations are those which are disintegrated with difficulty, and yield only a feeble detritus. On a grand scale they absorb moisture readily, and furnish stations characterized by their comparative dryness. Rocks of this class mostly contain a large proportion of carbonate of lime in their composition.

"*Eugeogenous* formations are those which abrade easily, and yield an abundant superficial detritus, which may be either of a sandy or clayey nature. They are comparatively impermeable, and consequently hygroscopic upon a grand scale, furnishing damper stations than the rocks of the opposite category, especially when the detritus is clayey.

"Every species possesses essentially its characteristic special range of lithological adaptability, in the same way that each possesses its characteristic special range of climatic adaptability. Under equal climatic conditions, some species are restricted

to more or less distinctly marked *dysgeogenous* situations, and others to more or less distinctly marked *eugeogenous* situations: but a greater number can adapt themselves, more or less decidedly, to stations of either class.

"In proportion as we advance from an austral to a boreal, and from a continental to an insular climate, the proportion in number which the *restricted* (*i. e.* dysgeogenous and eugeogenous) bear to the *ubiquitous* species, lessens, principally through reason of many of the eugeogenous species being able, under more humid conditions of climate, to adapt themselves also to dysgeogenous situations."

Having thus defined his soils, according to their mechanical properties, it is easy to divide the surface of Great Britain, or, indeed, of Europe, into six lithological zones, which are familiar to geologists, as—1st, the Granitoid and Metamorphic; 2nd, the Slaty, or Silurian and Devonian; 3rd, the Carboniferous; 4th, the new Red Sandstone; 5th, the Oolites and Cretaceous; 6th, the Clay soils of the London and Hampshire basins.

An attempt to arrange the flora of Great Britain according to these geological groups alone must be faulty, for the following reasons:—

1st. The Granitoid zone is confined principally to the northern part of Scotland, where altitude and latitude have more to do with the question than our author admits.

2nd. None of the six zones are lithologically the same throughout their extent. What relation, for instance, exists between the tenacious clays of Oxford and Kimmeridge and the crystalline limestones of the Isle of Purbeck, which are included in the same category?

We should like to hear from the author why the red sandstone of Herefordshire is so fertile; and whether it would continue so if the limestone layers, significantly called cornstones, were absent from its barren sandstones; or whether the County Carlow could grow its heavy crops of wheat and onions, if the calcareous gravels and corn clays, which cover the surface of that fertile county, were stripped off, and the bare granite rock exposed.

According to modern ideas respecting mineral manures, the chemical composition of the soil has at least as much influence on plants as its porosity; and we believe that a tabular view of analyses of soils, compared with the plants that grow upon them, and the composition of their ash, would do more to throw light upon the question discussed by Mr. Baker than any artificial classification of a geognostic character, which tacitly assumes the erroneous theory, that rocks of the same age have a similar chemical and lithological character.

POPULAR ZOOLOGY.

Popular History of Birds. By Adam White, F.L.S.
Popular British Conchology. By G. B. Sowerby, F.L.S.
Popular British Entomology. By Miss M. E. Catlow.
Popular History of British Zoophytes. By the Rev. Dr. Landsborough. London: Lovell Reeve. Royal 16mo. Price 10s. 6d. each.

"Popular Zoology" is our theme. It is one not limited to one epoch, or to one nation; it belongs to all periods of human history, and to all the families of man. When the wise King of the East pointed out the habits of the ant, and desired the sluggard to "consider her ways and be wise," he illustrated, in the most effective manner, the value of "Popular Zoology." When the Esquimaux, as he cuts up a seal, tells his children of its habits and its uses, he is giving a lesson on "Popular Zoology." When the Arab seeks for the praying Mantis, and tells his audience that it always points towards Mecca, where is placed the tomb of the Prophet, he is illustrating another branch of the same subject. The Indian, who expounds to his household the traditions of their fathers, tells them that the beavers are human beings, condemned for a time to live in their present form; but adds, that they have been heard to speak to each other in their own language, and seen to assemble for council before beginning their labours: he, too, in another manner, is expounding the "Popular Zoology" of his tribe and his epoch. It will be obvious, therefore, that the subject, in some of its many phases, is indigenous in all countries, and has a perennial existence, independent of paper and typography, woodcuts, or illustrations.

But it is not until observations are multiplied, and men possess the art of recording what they observe, that the subject can assume a methodical form. The first attempts at reducing to a system current opinions and ascertained facts must have exhibited very incongruous results. The snow-built hut of the Esquimaux, or the wigwam of the Indian, of whom we have spoken, were not more unlike the Coliseum at Rome than the first crude attempts at system, compared with that which science has now elaborated. Yet, the plan is far from complete. Much has been built, and materials for future additions have been brought together, but all parts are unfinished, and even the sites which ought to be occupied by others are not positively settled. Nay, some wise folks shake their heads, and say, that the foundation in some places is bad, and must be reconstructed.

Above two thousand years have passed away since Aristotle—justly termed the Father of Natural History—ceased from his labours. Slowly have facts been accumulated—gradually have those been grouped together,

and yielded their treasures to him who possessed the noble power to generalize upon them. We find the country now cleared, and producing crops, and but imperfectly estimate the difficulties encountered by the early settlers. To us Zoology has ever presented the aspect of a science—one eminently progressive, and of which "Excelsior" is the motto. We have witnessed not only a great change in the science itself, but one still more remarkable in the tone of the public mind in respect to its importance. There was a time in England when the will of a lady was attempted to be set aside on the ground of lunacy, because she took pleasure in forming a collection of insects. And many years have not passed by since the man who gave up a portion of his time to such pursuits would have been looked upon by the "practical man" as a busy idler, who wasted his time in frivolous pursuits.

Among the intelligent classes of the community this spirit has passed away. It is not merely that "practical" applications of Natural History knowledge are manifested, and justly prized; but that a recognition is made, though as yet imperfectly, of the value of such knowledge for its own sake. There is a lore, distinct from that of the mart or the exchange, which is not heard in the din of our forges or our factories—which does not sun itself in the haunts "where merchants most do congregate," and yet one which is now eagerly sought for. The mother wishes her children to know something of the beasts and birds, the butterflies, and the sea-side wonders—that by knowing such, they may learn the great lesson of humanity to all that live. The father wishes his boy to interest himself in such pursuits, as furnishing a resource against ennui, and, to some extent, a safeguard from the debasing influences to which youth is exposed. The teacher sees in it the means of calling into activity faculties which are not exercised in the old routine of education, and values natural history, not for the knowledge it imparts, but for its influence on those faculties by which we observe, compare, and generalise.

As these ideas and these wishes find utterance, means are taken for their fulfilment; and hence we see, in course of time, natural history taught in schools, recognised in colleges, and made one of the qualifications for the honours and emoluments which India offers to intelligent and ardent youth.

The teaching of zoology to the young might, we think, be made eminently attractive. If it does not become so, the fault lies with the teacher, not with the subject. Some fancy, that in order to teach zoology to children but little need be known about it. Never was there a greater mistake. To be able to teach it to children requires not only a good range of knowledge, but that rare acquirement—the power of conveying that

knowledge in precise, perspicuous, and yet not formal terms. Unless the teacher be properly prepared, his youngest pupil will soon find him out, and think, though the words may not be uttered, "I do see the bottom of *Master* Shallow." Unless his language be clear, his pupils will be floundering in the mud, and sometimes stick fast, unable to go any further. But if the mode of teaching be varied according to the ages, capacities, and attainments of the pupils, the pleasure is great and the advantage permanent.

Let us look at this subject a little more attentively. We hold that zoology may be adapted to persons of all ages, and may be rendered "popular" to all. It has, we consider, an expansive principle. Like the genie in the Eastern tale, it may be shut up in the vase drawn by the fisherman from the sea; or it may, like the same genie in a different condition, extend from the beach almost into the clouds above. How is this?

Let us take a happy, prattling child—one able to join in a little country stroll, and yet so young as to be still amenable to the regulations of the nursery. What does it seek to know? Are not its questions about the swallow and the robin, the bee and the butterfly, the snail, the frog, and all the other common things around? He wishes to know their habits and their modes of life, and all their wondrous instincts. So natural is this desire, that the American poet beautifully regards the acquisition of this knowledge as the forest education of his future hero:—

"Then the little Hiawatha
Learned of every bird its language—
Learned their names and all their secrets;
How they built their nests in summer;
Where they hid themselves in winter:
Talked with them whene'er he met them;
Called them 'Hiawatha's Chickens.'
Of all beasts he learned the language—
Learned their names and all their secrets;
How the beavers built their lodges;
Where the squirrels hid their acorns;
How the reindeer ran so swiftly;
Why the rabbit was so timid:
Talked with them whene'er he met them;
Called them 'Hiawatha's Brothers.'"

Song of Hiawatha.—LONGFELLOW.

Let us now take as our companion a boy or girl, who numbers a few years more, and we shall find not only that they wish to know to what groups certain animals belong, but also—what is not always so easy to answer—why they do so. In such cases the best way is to give the scientific term belonging to the class or order, and carefully explain what it means. To shrink too much from the use of scientific terms is a false

fear—the great point is to make sure that they are clearly understood; and we do not know anything more attractive to the young than to get them to enter into the discussion of some structural distinction—to lead them to trace out its bearings, and to find a solution for themselves of the question to be solved. Any one who doubts if structure, as connected with classification, can thus become interesting, need only ask a little circle of boys or girls, is the bat a bird? Bring out their knowledge and their notions as to its covering, its birth, its nourishment, and other particulars, and he will find all the faces become bright with intelligence as he proceeds, and the interest never slackens until the question is solved. Then let him stop. Give them a correct perception of the peculiarities by which the bird and the mammal are distinguished, and let the lesson end. They will carry away one idea clear and distinct; and they will long for the recurrence of a lesson which they like even better than they like play.

That they do so under circumstances is a fact of which we can speak with certainty. Some years ago a teacher had interested his pupils in zoology; their parents, however, regarding it as a waste of time, wished him to resume his previous course of instruction. He did so; but, to his surprise and gratification, the boys waited on him a few days afterwards to ask, "Would he kindly meet them half an hour earlier each day, and then give them their lesson on zoology, without trenching on the time given to other studies." It is almost needless to say that he gladly did so.

We have made no reference as yet to zoology as it appears to the scientific naturalist: to do so would lead us beyond the subject of "Popular Zoology." But we may remark, that even now the man of science is bringing before our view the existence of typical forms in all the great divisions of the animal kingdom, and their special adaptations to the requirements of every creature. The high and abstract generalizations of the physiologist will, in time, be generally recognised, and, after finding utterance in the halls of colleges and the class-room of the anatomist, will pass into the category of established facts, and give to popular zoology a new and added charm. Such truths, when rightly interpreted, speak a language which discloses symmetry and order reigning throughout all the world of animated existence, and which declares that the revelations of science can never be antagonistic to those of religion.

We think we are justified in the conclusion that zoology, in some of its many phases, may be the playmate of the child, the companion of the boy, the friend of manhood, and the associate of age. As we pass onward from youth it is ever changing its aspect. At times we catch a glimpse

of some truth, but shadowy and indistinct as the gigantic features which were seen in the cascade by the knightly lover of Undine; yet at some future day we seize it as a reality.

Such being our opinions, we read with pleasure the announcement of any new publications which add to the existing stock of knowledge, or are calculated to bring new recruits into the ranks. Yet, there is here one danger to be avoided—that of seeking to learn by books alone that which can only be acquired by books and specimens. Against this the late Professor Edward Forbes cautioned his students, in the address delivered by him in Edinburgh on the first of November, 1854, when entering on those duties which, unhappily for science, were so soon brought to a close. We shall quote his words, as they carry with them an authority derived in part from the reverential regard which attaches to his name, and in part from the circumstances under which they were uttered:—

"Were we to form our opinion from the number of books on all branches of the science issued almost monthly from the press in Britain alone, and perused with avidity, we might suppose ourselves a nation of naturalists. We are too well aware of the wide-spread ignorance of these studies. The fact is this, the books in question are bought and read—the interesting statements they contain excite momentary attention and pleasure; even scientific classifications seem pleasing, because suggestive of well digested order. But the knowledge so gained is word-knowledge only. Now, this kind of knowledge can take no root unless accompanied by a knowledge of things and beings."

The excellent series of natural history books issued by Mr. Reeve is not likely to produce such results. We have carefully examined those whose titles appear at the head of the present article, and can say that they are eminently fitted to tempt the youthful student out to the woods and fields, to the sea shore, and to those land-locked bays where the dredge can be used with the happiest effect. The natural objects will send the youth to the volumes wherein they are figured and described; the volumes will send him back to the objects for further observations on the living animals and their allied species.

We have here before us, birds, shells, insects, and zoophytes. Each subject is copiously illustrated, the figures are good, and in general the same remark will apply to the colouring. Had we been beside the colour-artist when engaged in his task, we would have felt disposed now and then to whisper in his ear, "o'erstep not the modesty of nature;" but it is seldom that such a caution would have been required; and there are instances in which our richest tints fall short of the gorgeous hues of nature. Each volume is by an author whose name is a guarantee for the character of the book; and each has done his best to make it both useful and attractive. When Elia, in his amusing enumeration of "books that

are no books," mentions those on natural history, he had assuredly never seen such as Mr. Reeve has now issued. If these do not serve to render zoology more popular than it has ever yet been, its prospects are "poor indeed."

We have already noticed in favourable terms the volume on shells—British Conchology, by Mr. Sowerby (No. VIII., Oct., 1855, p. 86)—and need not further revert to it. Yet, we must express a hope that our readers will recommend such of their friends as may, in a few weeks hence, be preparing to move with their families to the sea-side, to regard some of these volumes as a necessary part of the summer out-fit, and to order, at the same time, the one on Shells and the one on Zoophytes. When once again settled at home, they will, we think, admit that they never had so much enjoyment for so small an expenditure. And to those interested in zoology as a branch of school education we would say, that they could select no premiums more useful or acceptable than what this series supplies.

Miss M. E. Catlow's volume, "British Entomology," has the pages headed with the names of the months, from January to December; but as the airy beings of whom she treats do not choose to distribute themselves in so exact a mode, the early months are devoted to matters connected with structure, classification, and nomenclature; and the concluding months of the year are occupied with instructions respecting the capture, preservation, arrangement, and other particulars. In the months beginning with March and ending with October, we are introduced to "the whole of the British butterflies, as being the most beautiful and attractive of the insect world; many of our most common moths and beetles, and such other insects as are likely to come under the observation of the lover of nature." The definitions of orders, families, and genera are briefly and clearly given; and much of popular interest belonging to the habits of the several species is scattered throughout the pages. It is intended as a preparation for works of a higher scientific rank, such as those of Kirby and Spence, Curtis and Westwood; and all that is proposed has been gracefully and judiciously accomplished.

Mr. White's volume is altogether different—not in the subject merely, but in the mode in which it is treated. It does not attempt to give definitions of the families into which birds are divided; but, leaving the reader to search for them in works of a more technical character, it treats of the habits of the various groups. In doing so, it ranges over all climates, and marshals for our edification the flying denizens of the most distant lands. They pass before our eyes in rapid succession, exhibiting their

distinctive modes of life, and displaying plumage from the purest white to hues that seem borrowed from the rainbow. The book has one disadvantage to a man whose time is limited—once he takes it up it is difficult to lay down. He delays—to read one page more, and then another. He finds the information brought forward with such brevity that not a sentence could be omitted without injury; and as the sources from which the information is derived are, in many cases, not generally accessible, or known beyond the circle of the wealthy or the scientific, much of it comes before him with the charm of novelty added to that of truth. We have marked many attractive passages, but cannot find space for their insertion.

The volume of British Zoophytes, by the late Rev. Dr. Landsborough, bears the unmistakeable evidence of its paternity—his lineaments are on every feature. The book is *his* book. We have all that the naturalist requires as to classification, definition of orders, genera, and species, distribution round the coast, and other particulars. But in addition to this—and herein consists the peculiar charm of the volume—we have mention of his friends, of his excursions, of his feelings, his opinions, his religious convictions, and a store of pleasant observations and reminiscences. He writes just as he would have talked; and as we read we seem to have before us the benevolent, genial-minded man, delighting to acknowledge the aid derived from others; active and zealous in the discharge of all his duties as a Christian minister, yet finding time to prosecute his researches as a naturalist, and to write some of the most attractive volumes that we have read. He has passed away from the scene of his earthly labours; and if it be permitted in another and higher state of existence to look on some of the lowly works of creation which had here been the objects of admiration and study, sure we are that the spirit of that Scottish pastor would rejoice to find that those who are yet young in years were looking on what he had described with the devotional feeling he was ever anxious to inculcate; and as they progressed in the knowledge of this branch of "Popular Zoology," that they were led to exclaim in all sincerity, "Oh Lord! how manifold are Thy works; in wisdom hast Thou made them all."

March Winds and April Showers: being Notes and Notions on a few Created Things. By "Acheta." London: Lovell Reeve, 1854. 8vo. Price 5s.
May Flowers: being Notes and Notions on a few Created Things. By "Acheta." London: Lovell Reeve, 1855. 8vo. Price 5s.

We have been somewhat remiss in calling our readers' attention to these two charming volumes; but we now hope to make amends both to them and to their author. Acheta is already known to us by the "Episodes of Insect

Life," and other works; but we are inclined to prefer these two volumes to all the other productions of the pen of our cheerful, chirping cricket. Acheta, if thou wert "born in ages dark—could trace thy pedigree to Noah's ark, yet we would fain hope that thou would still abide with us in these more modern days, and enliven, refresh, and instruct us by thy "April Showers" and by thy "May Flowers," and this too, albeit we be but men of yesterday, and date our birth even one epoch later than that which ushered that showy upstart, the basking butterfly, and that moping creature, the modest moth, into life. We, as young, can the better appreciate the sayings of the elderly.

The first volume contains "Rambles in the Garden of Amphitrite." Then, emerging from the deep, and leaving the company of a rosy-tinted Nereid, we see in "Late Awakings," and in "Hedges in Winter," how exhaustless to the eye and mind which have been awakened are the particulars lying utterly hidden within the generals of nature; after which we have a delightful "Rummage in a Stone Cabinet," and this is the pleasantest chapter in the book. The usefulness of this chapter is in contrast to the next one, which tells of "Two Elm Trees," and is a story—a possible, not-probable one, but, withal, well told. "Voices in the Air, concerning the World's Show," bring these "April Showers" to a conclusion, and prepare the way for "May Flowers." No pen of mortal mould, says our author, could work out all the beautiful significance of such a title. With this we entirely agree, and are inclined both to overlook great defects and to take pleasure in small things. Those that know nature know how they love her small things. First, we have a chapter on "Bird and Man," and we would feign take from it a hint, and train our minds, not to be eagle-minds, nor yet humming-bird minds, but the sky-lark mind, which risest heavenward, joyously, melodiously, and bringest its music and its piety down again to earth, to spread delight and harmony around them. Next, in happy sequence, comes "Goldfinches in general, and ours in particular," the latter portion of which is an interesting goldfinch biography. Then come "Animals of air," "The Harpy that broods in every corner." We wish this Harpy would take to itself wings, and fly far away. "Things and Thoughts in a Thicket." After reading this chapter we would never again be at a loss for things to see, and thoughts to think in any thicket we might chance to find. And, finally, we have "Leaves of Insect Appropriation." This is a chapter for the microlepidopterist; for he knows of minute atoms that appropriate for themselves habitations in almost every sort of leaf. We have given the contents as it were of the twelve chapters which the two volumes consists, and it remains but to recommend them strongly to our readers' atten-

tion. We know of few more pleasing essays in the natural sciences, and we know of no works that we would more willingly place in the hands of our fair naturalists than these. Interesting alike to the scientific and to the unscientific, unsentimentally and pleasingly written—with vignettes worthy of Bewick—we think these volumes will become deservedly popular.

A Handbook to the Marine Aquarium. By Philip Henry Gosse, A.L.S. Small 8vo. pp. 47, with Frontispiece. London: John Van Voorst, Paternoster Row. 1855.

This little book is simply a manual containing a concise collection of "Practical instructions for constructing, stocking, and maintaining a tank, and for collecting plants and animals." To those who desire a cheaper medium of information on these points than Mr. Gosse's larger works, and to those who seek a fuller account of the most recent improvements in this—we might now almost say "fashionable"—branch of science, it is alike acceptable. Experience, doubtless, is the only sure guide to a thorough knowledge of how to manage animal life; yet those who are able to devote a large amount of time and talent to the subject may, by making known their observations, save their followers many sacrifices, not only of time and money, but of temper and opportunities. We hold it, then, to be the duty of every true naturalist to communicate to others all he knows of all he sees, and we bid him not fear that he will be richly rewarded—rewarded by public approbation and respect, as well as by receiving in return tenfold more than he is able to impart. We rejoice to see Mr. Gosse advancing so rapidly, yet steadily, in the department he has chosen, and his books continuing to maintain so high a tone of religious sentiment, not intrusive, but impressive, ever regulating, while it does not absorb more than a due share of his writings. Might we not suggest that it would greatly serve the cause of science were he to turn his attention also to *fresh water* aquaria? Not to speak of the more obvious facility in constructing and stocking them, fresh waters abound in forms much more highly organised than most of the denizens of ocean—creatures whose habits are little known, and would, therefore, well reward research. It would be enough to mention the water-beetles alone, in their different stages of perfection: who can detail any particulars of *their* manners? Some of our readers will readily call to mind, also, the recent and very interesting observations which Dr. Kinahan was led to make on the nidification of the Gasterostei; and startling to popular notions as the fact of fishes constructing bird-like nests may seem, who will presume to say that wonders more striking may not yet appear?

E

CONTRIBUTIONS TO THE NATURAL HISTORY OF LABUAN AND THE ADJACENT COASTS OF BORNEO. By James Motley, of Labuan, and Lewis Llewellyn Dillwyn, F.L.S., etc. Part I., pp. 62, with twelve coloured Plates. Square 8vo. London: John Van Voorst. July 2nd, 1855. Price, 10s. 6d.

"THE residence of Mr. Motley in Labuan," says the prospectus to this part, "affords himself and Mr. Dillwyn, the authors of the proposed 'Contributions,' an opportunity of making themselves acquainted with the natural products of that island; and believing that the nature of its *Fauna* is by no means thoroughly known to Zoologists, and that the habits of the animals constituting that *Fauna* have been but little observed, and also considering that such information respecting them as they have already obtained, and shall probably again obtain, may prove an acceptable contribution to the science of Zoology, they are induced to offer to naturalists the forthcoming publication."

Never before, we believe, has the attempt been made to write a Natural History of Labuan or Borneo.

In the earlier years of our childhood—when the adventures of Robinson Crusoe were thrown aside for some of the more truth-telling stories of voyagers round the world, we can recollect with what avidity we perused the accounts of their visits to the spice islands of Asia. We fancied what a Paradise all and each of them must have been; and we wondered why the sea captains did not draw up their wearied vessels on the loud resounding sea shore, and spend the remainder of their lives amid the spicy breezes that blew soft throughout these isles. Why it is we cannot say, but much of this fascination still clings to us, and any work that tells us aught about them will still be a welcome one to us, even though the stern east winds of reality have somewhat dissipated the light mists of our boyish fancy.

Doubtless, our readers have lately been familiar with the name of Borneo, as connected with Rajah Sir James Brooke. But we now wish them to think of it in connection with that of James Motley, in whom we gladly welcome the natural historian of this hitherto much neglected place.

These contributions are to contain descriptions of such vertebrate and invertebrate animals as may inhabit the island, accompanied with notes on their habits. Illustrations of the rarer animals are to be given, and it is expected that two or three parts shall be published annually. The part before us is the first of the series, and contains, in addition to sixty-two pages of letterpress, twelve beautifully-coloured plates, containing figures of two mammals, five birds, and five reptiles, all drawn by J. Wolf, an artist whose representations bear the impress of nature, without any exaggeration of form or colour.

We would gladly see more space devoted to the notices of the habits of the various animals that are described and figured. The following extract in reference to the curious habits of the Megapodius Cumingii will be found interesting. It is accompanied by a coloured drawing of the bird, and a representation of its "hatching mounds:"—

"In Labuan they are not uncommon, and are said to be principally confined to small islands, to such more especially as have sandy beaches; they are very rarely to be seen, being extremely shy and frequenting dense and flat parts of the jungle, where the ratans grow, and where the luxuriance of the vegetation renders concealment easy. The Malays snare them by forming long thick fences in unfrequented parts of the jungle, in which, at certain intervals, they leave openings where they place traps; the birds run through the jungle in search of food, and, coming to this fence, run along it till they find one of the openings, through which they push their way, and are caught in the trap. In walking they lift up their feet very high, and set up their backs something like Guinea fowls; they frequently make a loud noise like the screech of a chicken when caught; they are very pugnacious, and fight with great fury by jumping upon one another's backs, and scratching with their long strong claws. Their food principally consists of seeds and insects. The eggs are of a fine dark cream-colour and of a very large size, three of them weighing nearly as much as a full-grown bird. According to the account given by the Malays, each bird lays about eight or ten eggs at each time of breeding, and their nests are merely large heaps of shells and rubbish, deposited over the sandy soil, in which the eggs are buried to the depth of about eighteen inches. Since receiving this account, however, we have had an opportunity of inspecting a very large and perfect nest, or breeding hill, and found it to be about twenty feet in diameter, and composed of sand, earth, and sticks; it was close to the beach, just within the jungle, and scarcely above high-water mark, and appeared to have been used for many years. The boatmen seemed to have no clue to what part of the hillock contained eggs, but said that they were never without some when frequented at all; they sought for nearly half an hour in vain before they found one, and then got about a dozen together; they were buried at a depth of from one to three feet, in an upright position, and the ground about them was astonishingly hard. The eggs thus deposited are left to be hatched by the heat of the sun, and this, the Malays assert, requires between three and four months to complete: those obtained from this heap were brought home and buried in a box of sand, and a month or two afterwards it was discovered they had all hatched, but that from neglecting to place them in a proper (*i.e.*, probably an upright) position, the chicks could not get up through the sand, and had all perished. When hatched, the chicks are almost entirely fledged; even the long quills being, as the Malays say, 'needled.' When first dug out, some of the eggs had lost much of their outer colour, which appeared to have scaled off, leaving only a white chalky shell. On a former occasion some eggs were brought by the natives, and were buried in a box of sand and exposed to the weather: at the end of about three weeks one of the chicks was hatched; a Malay who saw it emerge, said, that it just shook off the sand and ran away so fast that it was with difficulty caught; it then appeared to be nearly half grown, and from the first fed itself without hesitation, scratching and turning up the sand like an old bird. Two more afterwards emerged in the same state. Their eggs are held in such high estimation as food both by natives and Europeans, that one cannot but fear that these interesting birds, though now so abundant, will ere long become scarce."

Many other extracts we might give of equal interest, but, advising our readers to select for themselves, and wishing Messrs. Motley and Dillwyn every success in their undertaking, we would recommend every one taking an interest in Natural History to subscribe for these contributions.

RECENT WORKS ON THE DIPTERA OF NORTHERN EUROPE. SUPPLEMENTARY NOTICE.

Zetterstedt, Diptera Scandinaviæ. Tom. XII. 8vo. Lundæ, 1855.
Stenhammar, Copromyzinæ Scandinaviæ. 8vo. pp. 184. Holmiæ, 1855.

In a previous number (July, 1855) we have reviewed at large Zetterstedt's important work on the Diptera of Sweden, Norway, Denmark, Lapland, and Finland, completed in the year 1852, in the compass of eleven 8vo. voumes. The twelfth volume, which has appeared after the further lapse of three years, is simply a supplement, containing descriptions of the species added to the fauna of that region in the interval, and some further documents upon the distribution and local range of those before enumerated. The species added amount to a hundred and seventy-eight, counting in a few recorded, during the intervening years, by Bohemann, Wahlberg, and Stenhammar. Of this number, fifty-eight, or a third of the whole, are given as new species. The genus *Idia* is for the first time introduced into the Swedish fauna; and with this *Mochlonyx* may be coupled, though included in *Corethra*. Modifications of the system in the preceding volumes there are none, nor yet rectifications of the nomenclature, excepting in one or two instances of trivial names of repeated occurrence. In this respect there remains for his successors a task, declined by the veteran author, well worth the pains and time requisite for its due performance, since Zetterstedt henceforth takes place beside Meigen as a classic of the science.

We have also to notice another volume which may serve for a specimen of the edifice we would desire to see erected on the foundation that Zetterstedt has laid. The expectations that were raised by Stenhammar's remarkable Monograph of the Swedish Ephydrinæ have not been disappointed in his more recent essay on the Copromyzinæ (Sphaerocerini), although the narrower groundwork has scarcely afforded as much room for originality. In both, the same insight into natural affinities, and the like minute comparative examination of all the parts, for the expressive marks of these, have succeeded in reducing the multitude of species, here largely increased by the diligence of the collector, into a very fair and graduated arrangement, illustrated by descriptions as full as they could well be made without needless and tedious repetition, and adapted to the purposes of the student by the consistent use of a precise glossary, and by the constantly relative aspect in which they have been conceived. In the more recent essay, which we are now considering in particular, the synonymy of the generic and trivial names has been weighed in an impartial balance, and the right of priority recognised with an anxious fidelity in discussion which we cannot but attest,

even while we may differ from the author's conclusions in one or two instances. Of the British species first described in the Annals of Natural History, and now re-published in Walker's Insecta Britannica, the greater number are identified among the indigenæ of Sweden; and if some remain undetermined, it is fairly to be attributed to the brief and insufficient descriptions given in that original, and not to any defect of conscientious diligence on the part of the Swedish Monographer. The external relations of the family, in which Cœlopa is included, have received their due attention also, and the allied but excluded genera *Orygma* Mg. and *Phycodromia* Stnh. are illustrated accordingly; the latter identical with *Malacomyia*, as Stenhammar has rightly conjectured, failing access to the original source for verification. Little or nothing has been added, indeed, to our previous information touching the internal anatomy, embryology, and economy of the tribe; nor is this here so much to be regretted, where there appears to be such close agreement of habits among the species in general. But in regard to the Ephydrinæ, it were much to be desired that these more obscure points of their Natural History, and on some of which we have scarcely any satisfactory documents, had shared in the light which Stenhammar has concentrated so industriously on the arrangement of the groups and the characteristic of the species.

THE PHILOSOPHY OF NATURAL HISTORY.

Das Leben in der Natur. Bildungs und Entwickelungsstufen desselben in Pflanze, Thier und Mensch. Naturhistorisch-philosophisch dargestellt von Professor Hinrichs. 8vo. Halle: 1854.

The works on Natural History which a teeming press offers arrange themselves, with rare exceptions, under one of these two denominations—the scientific and the popular. Few, indeed, in our age and country, are forward to adopt the title philosophical; whether this be deemed too bold a pretension, or that the freaks of some of her professed wooers have gotten a bad name for philosophy in this connection. We are disposed to think that the latter is nearly the state of the case. It needs not now to inquire whether Oken's obscurities or the perspicuity of Comte have had the more to do in producing a jealous feeling in minds that seek truth more than system, and cling to faith closer than to philosophy. But if there be a so-called philosophy of nature that is materialistic and irreligious, including, in the latter, pantheism as well as atheism; is it doubtful that there is also a naturalism, not the less irreligious for being ostentatiously anti-phi-

losophical, and actually unphilosophical? There is a way that creeps as well as one that soars, both ending equally in the foggy region of doubt and the mire of materialism. We have no desire to forge or find intellectual fetters—to circumscribe the sphere of observation or to depreciate the gains of induction. Revelation behoves not to be racked for secrets which nature will yield unreluctantly to patient investigation. The natural sciences have objects different from those of faith; but the spirit of this is all-pervading. Without this direction, the material world lies there—body without spirit—dead and deadening, and the boldest flight of speculation is but to attain a pinnacle, from which to dash itself down, and perish more signally. And in the by-ways of philosophy there are broken bones many, lying about for others' warning. But it happens often that the errors perish with the authors, or after them; while the good that they may have found survives, an enduring inheritance. The history even of the errors is instructive; there seems to be a sort of chronological fluctuation in opposite directions, so that from the extreme point it is not difficult to anticipate a regress towards the other. The oscillations, all the while, may be diminishing in their range, and the extremes alternately tending to approach to each other, and so to the point of rest and equilibrium. In which direction, let us ask, is the deviation now?

Hinrich, in the little volume named above, approaching the highest problem of the natural sciences—life as the principle of organization—deems that he has found more that is suggestive in a former era than in the present. "The purest ideal in nature is life, and just this it is attempted now to account for by the properties of matter." In the opening chapter, "life," the two aspects of natural philosophy, the materialistic and the teleological, are contrasted and examined. The former, as it represents organization as a mere mechanism, and life as a complex of physical properties, is a thing of the past; but the chemical, or electro-chemical explanation, survives. Liebig, whose writings, by their popularity, have exercised so wide an influence, does not himself escape out of the sphere of materialism. He is not always consistent, indeed, and thus has laid himself open to reproach from those who, like Moleschott, have not shrunk from pushing the doctrines of organic chemistry to their most rigid consequences. But life is no result of the chemical forces, which unless it can subordinate and resist, it must perish of necessity. Neither is an organism a chemical product any more than it is a mere mechanism. Chemistry has succeeded in imitating some excretions; but these are not organic products, but what the organism rejects as incompatible.

The teleological view is in advance of the materialistic; but it also has

often stopped short in efficient causes, and has not comprehended them as all *in* the final cause; content to recognise this as something unknown, and not as therefore to be sought to be known. As expositors of the teleological theory, Blumenbach, Kant, Schelling, Hegel, Scheitlin, pass by in review. The discussion is acute, and a reader familiar with Whewell's History and Philosophy of the Inductive Sciences need not feel utterly repelled by the peculiar logical forms of Hinrich's criticism. Sometimes, indeed, we are tempted to recur to the "inaccurate phrases" against which he has protested in the preface, as that "the forms of the Hegelian dialectic eat one another up." It would be difficult to give a fair representation of the argument by any extracts we could have room for, and we fear that what is good Hegelish might re-appear, through a translation, as bad English. The very terms of the definition which he adopts for life would need themselves to be defined, and distinguished out of their common acceptation. We have used much liberty in the selection and compression of a few sentences taken here and there, to exemplify the author's points of view in particular branches of the subject. The reader desiring to grasp the links of connection is invited to seek them in the original.

Life then is considered in its development, that is faculty (Trieb,) which is fourfold; and the four remaining chapters are devoted to the illustration of these in order. As Hinrich recognises three kinds only of organisms—plant, animal, man—there is a difference of the divisions, though a corresponding order.

The plastic faculty (nisus formativus) lies at the root of all organization. This is the principle of life as developed in the plant, self-preservation and reproduction, without the possibility of sensation. Animal life is the possibility of sensation; in its first degrees not the reality of it. Sensation does not actually exist without distinction of organs. A sense that is all senses in one is none in particular. The simplest animal organisms—the infusories—appear totally insensible to impressions from without. But their motions originate in themselves—are spontaneous. The apparently voluntary motions of the spores of algæ are not so. They are motions communicated through the forcible expulsion from cells and tubes. The exterior of the plant is rigid; if it yields, it yields to an impulse from without. Organic contractility is first developed in sarcode, the commencement of animal organization. Sarcode, cell, tissue, organ, are in succession. The infusories are the simplest forms of animal life; but the higher animals, and man, do not originate as infusories, are not an aggregate of infusories as Oken has held. In the lower animals the secretion becomes at last inorganic, incrustation. The higher the animal in the scale, the fewer the parts without sensation. Feathers, wool, hair, are external secretions, yet not

inorganic in the same degree, but rather to be compared with the plant, which is organic without sensation.

Ascending in the animal scale, there are developed in succession, constructiveness, instinct, intelligence. The third chapter, the longest of the book, is devoted to the first of these. Reimarus is largely quoted for the illustration of this faculty. But after all the pains which Hinrich has taken to distinguish it from instinct, his own representations seem to result in a distinction only of degree and direction. Both are called out by the relation to external nature. When this, from being the means, becomes the medium of organic life, constructiveness (Kunst-trieb) is developed. So long as the dependence of the organism upon the medium is immediate, constructiveness prevails. The dependence diminished, instinct succeeds. In constructiveness the activity is less that of the animal than of the medium. The bee forms its cell according to the same law by which a fluid crystallizes in the rock ; but the animal has not perception of the law. If it were the product of the animal only, it should be organic ; but as the product of nature through the animal, it is inorganic in symmetrical form and figure.

The same vital principle, which is the source of the plastic faculty, is that also of constructiveness in bringing the animal into relation with its medium, and of instinct in making it more independent of the medium. Instinct is the negative of constructiveness, but not in the sense of defect. The negative is higher than the negatived : this is logically true, true also experimentally. The lowest classes of animals have not constructiveness ; it is eminently developed in insects and birds, and finally disappears in the highest classes, in which instinct is most conspicuous. But as constructiveness passes into instinct, some have both, as migratory birds. Hinrich regards instinct chiefly as developed in the societies of animals, in their migration and domestication. What draws animals from one climate to another is out of them, but at the same time in them. The stork does not seek the South, the South draws the stork. The more that instinct takes the place of constructiveness, the more independent of external nature the animal becomes, the nearer to man—the more *his* intelligence becomes the power that gives its determined direction to the instinct of the animal. It is this which leads to the illusion of supposing animals to have reason like man. Does an animal appear wise, docile—it is so through the human intelligence. Parrots do not learn to speak, but to repeat the words they are taught, as sensations (sounds), not as terms (significant). Words are signs, but of ideas, not of sensations, as sounds, tones. The tongue is necessary for speech, but as the means, not as the organ of it. The tongue is the organ of taste ; the organ of speech is the Inner of the man, the spirit.

Books of natural history have defined man as an animal having reason; but since no animal has reason, this definition contradicts itself. The animal is animal, because it is incapable of understanding and reason; man is man, as he is not an animal. The human intelligence is no animal instinct exalted, the animal is negatived in the man. Instinct has been termed the feeling of connection with the world without. This definition is too general; for instinct is directed to a determined object. Man, too, feels himself in connection with the world, but has not instinct. Liberty and intelligence exclude instinct, as this is the direction to a determined object. Man *must* only if he *will;* the animal must because it is not free.

Have we not stumbled here on some propositions that are identical, and so conclude to nothing. It seems, too, as if the author had derived his illustrations too much from books, to the neglect of personal observation. The plan of the work was conceived, as he tells us, under the free blue sky; yet we miss somewhat of the freshness of such an origin. Reimarus, whom he quotes, is not altogether wrong, when he prizes the knowledge of the instincts of animals possessed by shepherds and huntsmen, fishers and fowlers, higher than the lore of Academicians. At the same time we could fancy Hinrich himself a follower of the chase, from the zeal with which he has vindicated it as a truly human pleasure, and in no wise assimilating man to the beasts of prey. "Hunting is no cruelty to animals, though hunting on another's grounds is cruelty to man." Some pages are devoted to the philosophy of the chase, and fox-hunting in England is brought in for an illustration. If such a theme be unexpected in a book of philosophy, yet it is hardly more so than the bugle-note of war with which Oken ends his Natural Philosophy. But Oken's philosophy has no prominent place in Hinrich's sketch, being noticed only to be refuted; and as for Esenbeck, his "schematism" and his triads have not procured him so much as a mention. Notwithstanding these omissions, if they should be regarded as such, the book affords a varied and lively summary of the efforts of noted thinkers—those of Germany in particular—to grapple and bind in terms the subtle idea of that mysterious principle, which all are conscious of, and many curious about—amusing, too, for the glimpses interspersed of the exuberant fancies in which the acutest intellects are prone to disport, under the guise of rigid induction, when the positive out of themselves is excluded, and subjectivity has its unrestrained play. That Hinrich has succeeded where so many have failed, we do not imply, but the earnest investigation of such a problem seems not to be without its use as a discipline of certain faculties, if it were but that we may learn their limits, and apprehend by consequence their right use and direction.—A. H. H.

On the Structure of Victoria regia. By George Lawson, F.R.P.S., F.B.S. From Proceedings of the Botanical Society for November, 1855.

If the sums which have been expended on Victoria houses, if the sumptuous illustrations of Hooker and Fitch, are justified by the gorgeous amplitude of the regal water-lily, its claims to attention in a scientific view also have not been neglected. Of the peculiar structure which marks the allied families of the Nymphæaceæ and Nelumbiaceæ (dicotyledones with monocotyledonous structure), it presents not only a most conspicuous, but, in some points, a singular example. Deficient vascularity, in the stems of the Victoria, issues in absolute privation; and the fluids permeate the cellular tissue without the assistance of closed vessels. After all that Lindley, Hooker, Planchon, Lœscher, Henfrey, and Trécul have contributed to the history of its organization, Mr. Lawson has found some points still requiring further elucidation. One material subject of his remarks is the nature of the numerous minute perforations found in the mature leaf of the Victoria apart from the stomata, which last are placed in the upper surface of the leaf as in other Nymphæaceæ. Planchon has applied to these pores the name of *stomatodes*, and imagines that they serve for the escape of gas generated by the water in the spaces between the ribs which bear up the leaf. Trécul, without denying this function to them, has described a peculiar formation and disruption of cells in the interior of the leaf, which precedes the opening of these pores. Mr. Lawson, indeed, thinks that they present merely an incipient condition of that partial development of parenchyma observable in many water plants, and of which Ovirandra fenestralis offers such a striking instance, the leaf being there reduced to a mere skeleton. Trécul's observations, however, might lead us to inquire whether the development of these apertures, in the leaf originally continuous, is properly analogous to reduction of tissue in the sense in which Mr. Lawson uses the phrase.

Miscellaneous Notices.

February 4th, 1856, died, at a very advanced age, Dr. Frederick Klug, Director of the Royal Museum, Berlin, one of the eminent Entomologists who have illustrated that establishment in a sort of scientific descent. The most eminent perhaps of these, the late Professor Erichson, was son-in-law to Klug, one of whose latest literary labours was a biographical memoir of Erichson, inserted in the Stettin Entomological Journal of 1850. Klug's scientific publications are numerous and well known. The stores of the unrivalled insect collection of the Berlin Museum, under his direction, were made available, with the most generous liberality, to those engaged in such studies; and in him, the friend is no less regretted in private life, than the veteran is missed from the fields of science.

Popular History of the Palms and their Allies. By Berthold Seeman, Ph.D., M.A., F.L.S., &c. Reeve: London. 1856.

The numerous publications of Mr. Reeve, belonging to the same series as that to which our article refers, are among the most successful attempts to bring a knowledge of different departments of Natural History within reach of those who have neither time nor opportunity to consult expensive and more purely technical works. Vast stores of facts have been long known to professional or amateur naturalists only, although eminently calculated to excite interest in the minds of others. The more general diffusion of such knowledge is a characteristic feature of the present age. Every fact in science is, in one way or another, an addition to the sum of man's happiness. The relative value of such fact may differ in the estimation of parties, just as their tastes or aims are different. Additions to our stores of knowledge are frequently deemed important only because they have a direct bearing on the increase of commerce, and on the relations of different countries. We cannot find fault with such views, provided that the labours of men of science, instead of being despised, are duly valued, because they may lead to results conferring inestimable benefits on mankind. Many rest satisfied with being clothed and fed, and never trouble themselves as to the sources whence the necessaries of life are derived; they care not what countries produce such articles, and never consider how dependent they are on the efforts of their fellow-men in distant regions. Mr. Seeman's work, and others of the same nature, are highly useful in promoting a knowledge of various "common things." The following extract may serve as a sample of the information conveyed, and of the pleasant style in which our author writes:—

"Take, for instance, a walk in the streets of London, and observe everywhere how substances originally obtained from Palms, and turned to useful purposes, meet your eye. That ragged boy, sweeping the crossing, and begging you with a faltering voice, real or assumed, to remember poor Jack, holds in his hands a broom, the fibrous substance of which was cut by the wild Indians of Brazil from the stems of a Palm; that gentleman, dressed in the tiptop of fashion, who playfully swings his "Penang lawyer," little thinks that in carrying that walking-cane he is, in fact, carrying a young plant of *Licuala acutifida;* that fine lady's parasol-knob—what is it but a coquilla-nut turned into that shape? Those 'chip hats,' so extensively worn on fine summer days, what are they made of?—the leaves of a Cuban Palm (Thrinax argentea). Look at that stand, with heaps of dates upon it, gathered on the borders of the great desert of Sahara, and eagerly purchased by the people; look at those fine cocoa-nuts, grown on the shores of the Indian ocean and the Caribbean sea, and here retailed in penny slices to the humbler inhabitants of the British metropolis. Step into a house, and there, too, you will observe many products obtained from Palms in the most remote corners of the globe. That thick, brownish matting, now so generally used for covering halls, staircases, and offices, is woven from the husk (mesocarpium) surrounding the cocoa-nut. Those beautiful pieces of furniture which arrest your attention are made of

various kinds of Palm-wood. That elegant little play-thing in the hands of yonder child was skilfully manufactured of the bone-like kernels (albumen) of the vegetable Ivory Palm. Those fine stearic candles illumining the room—what are they composed of but the fatty substance extracted from the fruit of the oil-palm and the cocoa-nut? That sago which, under various disguises, appears at the dinner-table, it also is the produce, the pith, of Palms flourishing in the islands of the East Indian Archipelago. That arrack, pronounced by connoisseurs to be of excellent quality, it, too, is extracted from a Palm—the Cocoa Palm. Be still more inquisitive, and ask of what that tooth-powder consists, and you will be told that its chief ingredients are Betel-nuts (previously reduced to charcoal) and Dragon's-blood—both produced by Palms; or examine our toilet soap, and you will find that the fatty substance which enters so largely into the composition of it has been derived from Palms. Everywhere you will meet numerous products of Palms, either in a raw state, or turned by the ingenuity of man to some useful purpose; and this, too, at a place thousands of miles from those regions which Palms principally acknowledge as their native country. Even at such a distance their benign influence is strongly felt, and millions of people, whose privilege it has never been to obtain even a glimpse of a single Palm, entertain feelings of well-founded gratitude as to an order of plants which is to them a source of so much usefulness and enjoyment."

It may be that there are some members of society—we sincerely hope their numbers will increase—who, setting aside all selfish views, are only led to consider facts as important in proportion to the lasting benefits they confer directly or indirectly as to the moral condition of their fellows: to such this volume communicates some things of the highest importance. Our author remarks (p. 191, et seq.), "The state of debasement of the negro races of Africa has long been a subject of great concern to philanthropists, and numerous schemes have been tried to raise them to the rank of intelligent beings; but all have hitherto proved an utter failure." In treating of the Palm, known to botanists as the Elæis Guineensis, abundant evidence from the highest authorities is brought forward to show that a full development of the trade in the African Palm oil will most certainly tend to the suppression of the slave trade. The product alluded to is now extensively employed in the manufacture of the patent stearine candles, and also in that of soap. The importation of Palm oil employs 20,000 tons of shipping in Liverpool alone. The trade is one of barter; the manufactures of Manchester, Birmingham, Glasgow are the articles given in exchange. There is thus, in the first place, a source of outlet for our home productions, and secondly, a branch of trade encouraged which the Africans find more profitable than that in slaves. The best preventive squadrons must, therefore, be merchant ships laden with our hardware, cottons, and other articles, instead of armed vessels, supported at a great expense to the public. And when to all this we add the efforts of zealous missionaries, we doubt not Africa's better days are approaching.

We need only say, further, Mr. Seeman's volume contains a large amount of varied and useful information, such as we should desire to see

more generally diffused. The author's own qualifications for the proper treatment of his subject are of a high order, and the list of contributors, whose aid he frankly acknowledges in the preface, is a sufficient guarantee for the accuracy of the information contained in this excellent work. The sheets have, moreover, passed under the review of the veteran Baron Humboldt, than whom there is no one better qualified to testify as to the importance of the contents.

Plants belonging to the family of the Palms occupy as prominent a position in the estimation of the botanist, as they do in the landscape of the regions where they abound. They have attracted the attention of numerous observers, and since the time of Linnæus, when only fifteen were known to science, nearly 600 are now included in the list of species. By the labours of Von Martius and others, a large amount of information has been contributed as to their structure, distribution, and products.

Palms are in general characterised by their perfect flowers, supported on a branched scaly spadix, and a small embryo imbedded in albumen of fleshy or bony texture. In the introduction to the work, Mr. Seeman treats of the general aspect, organization, and distribution of this noble family. The species, while having a strong resemblance, do, nevertheless, present a considerable difference in the length and general features of their stems, in the form of their leaves, and in other particulars. Although there are some fine examples under cultivation in different parts of Europe, it would be difficult, from such isolated individuals, to realize a full conception of those groups of majestic and of graceful Palms which arrest attention in the equatorial zone. While some natural orders of plants have their representatives in many different parts of the world, the Palms are almost exclusively tropical, "being most numerous, both in species and individuals, towards the equator, and decreasing on receding from it. Few extend their range into the temperate zones, and none, it is hardly necessary to add, venture within the limits of the arctic and antarctic circles. The true palm climate has a mean annual temperature of 70° to 81°. 5 F."

Mr. Seeman describes the characters, distribution, and properties of species belonging to sixty-two genera, and for convenience of reference these are arranged in alphabetical order, and the details comprehend matters of interest to the botanist as well as to the general reader.

In temperate climates our necessaries and luxuries are derived from various sources. The great family of the Palms comprehends in itself a complete store of materials—a vegetable bazaar—from which different branches of the human family derive useful products in the greatest variety. Without specifying the particular species—for which we must refer our

readers to the book itself—it may be sufficient to say that Palms yield valuable timber, thatch, paper, carpets, cloth, thread, water-proof garments, ropes, combs, torches, brooms, bow-strings, fishing-nets, hats, fans, and a variety of other articles, without requiring much preparation at the hands of man, to whose comfort they minister so bountifully. From the sap are prepared arrack, vinegar, and sugar. Some yield wax in considerable quantity. The leaf-buds, or "cabbage," of certain species, as well as the young inflorescence, afford delicate and nourishing food. The fibrous material at the base of certain species is a ready-made strainer, employed to separate impurities from the sap got from the stem itself. The Tahitians use in their toilet a gum-like exudation procured from the cocoa-nut Palm. The nuts are turned to account in various ways; the hard shell yields cups, lamps, and platters; and in our own country, handles of umbrellas, match-boxes, &c., are manufactured from the same part. The contents of the nut constitute the principal means of subsistence in some countries, and in others a valuable oil is derived from the same. The needle-like spines of a species of Gulielma are ready-made instruments for the operation of tattooing. The rough aerial roots of the Zanora Palm of Panama serve as natural graters or raspers, where metallic instruments would soon be destroyed by damp. The stem of the Paxiúba of Brazil is used for making a wind instrument, a rude kind of trumpet. The entire spatha of the Bussú of Brazil forms a ready-made cap without seam. The men of Scinde employ the hard seeds of a species of Chamaerops instead of leaden bullets; and in Chili the nuts of a Jubœa resemble marbles, and are used by the boys as substitutes for them. The blow tubes for propelling poisoned arrows are derived from the stems of a small species of Iriartea. Dr. J. D. Hooker, in his Himalayan journals, describes a bridge, on the suspension principle, formed from the stems of a species of Calamus. But we must refer to the book itself for complete details as to the species, and the countries where Palms yield such variety of useful products. The mere utilitarian will find in Mr. Seeman's book valuable details, amply sufficient to gratify his cravings.

The volume also contains some points of interest to the physiologist. The great extent of surface presented by individual leaves is worthy of notice. A leaf of Raphia tædigera has 200 square feet of expanse. Many trees have in the number of leaves a compensation for the relatively small size of each. In Palms the converse is generally true; the leaves are not numerous, but they are of large dimensions. The amount of sap given out by some is also worthy of notice. A good tree of Caryota urens will yield, when tapped, 100 pints in 24 hours; the Jubœa spectabilis is a still

more remarkable instance; from its sap the "Miel de Palma" (Palm-honey) is procured, and the trunk has been known to give 90 gallons of sap, even though cut down and thus detached from the soil.

Our readers may endeavour to estimate the value of a classified collection comprehending the varied products of the Palms alone; if embracing the whole range of the vegetable kingdom, it would not be easy to realize the proportionate importance of such a museum. London already possesses its museum of economic botany, instituted through the praiseworthy exertions of Sir W. J. Hooker, the respected director of the Royal Garden. There ought to be a similar collection in the capitals, at least, of Ireland and Scotland. The best substitutes in the absence of such are works like that of Mr. Seeman's. The diffusion of accurate information respecting the natural resources of different countries has made rather slow progress, and every contribution tending to promote the full development of such resources must be welcomed by every practical mind.

In treating of each genus a distinct paragraph for botanical characters, geographical distribution, and useful products, is the method we should prefer. This has not been so systematically adhered to as it might. A synoptical table of genera, with at least the names of species comprehended n each, would also have added to the value of the "Popular History of Palms." Nevertheless, we cordially recommend it as a valuable addition to the history of the sources of economic products. The book is illustrated by twenty coloured plates, representing twenty-five distinct species. These greatly add to its value.

On the Variation of Species, with especial reference to the Insecta, followed by an inquiry into the Nature of Genera. By T. Vernon Wollaston, M.A., F.L.S. 8vo. Van Voorst, London, 1856.

The primary purpose of this little volume is to give in one view the results of Mr. Wollaston's researches in the Madeira Islands, as they bear upon the causes and mode of variation in insects. He has drawn the illustrations, however, from a much wider field, and has made it a main object to call attention to the laws of geographical distribution in the same class of beings. Ascending, in the course of this inquiry, from the individual and casual variations to those which, attaining to a certain frequency and some degree of permanence, are qualified as varieties, the discussion has embraced the ideas of species and genus, and their existence in nature. In respect to the former, there seems to be admitted, as a necessary postulate,

the theory of a single centre of distribution, and a common origin for each species.

The desire to write a readable book on a dry subject (an endeavour to which, as reviewers, we feelingly say, "good luck") has perhaps diverted Mr. Wollaston somewhat from the precision and compression of style of which he has elsewhere shown himself so capable, and by which he might here have done more justice to his own conceptions. There is an essay, not a very recent one, by Spring, "On the ideas of Genus, Species, and Variety in Natural History, and the causes of variation in the Organic Kingdoms,"* to which we might refer as an example of another mode of handling such a subject. We shall only quote from this, however, a few sentences, which may help to explain and to remove some obscurities involved in many of the speculations about species and varieties, their relation and distribution:—

"The idea of the species is never fully expressed by a single individual; it can only be exhausted by the aggregate of all the individuals existent in all places and times. . . . . Every discrepancy between individuals is a more or less full development of the idea of the species, produced by external influences; and the common opinion is erroneous which regards those discrepancies (the varieties) as deviations *from*, and not as contained *in*, the idea of the species. They belong, universally, to the idea of the species, in which they are expressed as regards their possible existence. For the same reason, they are not "accidental," as others say; for, given the possibility in the idea of the species, then by necessary consequence certain external conditions (influences) will produce certain alterations or degrees of development."

We have remarked one or two instances of careless style, which might have passed unchallenged in the common run of popular essays, but which we regret should have slipped from the pen which Mr. Wollaston can wield so vigorously and so well. When an insect is characterized as being more or "less parallel," we naturally inquire, "*parallel*" to what? To what purpose, again, such a solecism as "climatal," and this repeatedly? Does not climatic, or climatical, accurately convey the idea intended, in a form agreeable to etymology, and sanctioned by usage? To the following sentence we have failed in our endeavours to affix any suitable and consistent meaning:—"Thus, for instance, the *Pissodes notatus* Fab., a weevil which occurs in pine forests from Lapland to Barbary, and which has been naturalized in the Madeira Islands, passes through the alternations to which it is specifically subject, irrespective of country." How is the insect *specifically* subject to alternations, and to *alternations* of what? Irrespective of such minuter criticisms, however, the volume contains a large amount of interesting information on the subject in chief, and presents some general conclusions which have both originality and apparent evi-

* Fr. Fleischer, Leipzig, 1838.

dence to recommend them to consideration. Particularly instructive are the remarks on the effects of "isolation" on the character of insects, for the study of which, the group of islands, of which Madeira is the principal, affords so favourable a field, by their geographical position and physical configuration, and Mr. Wollaston's indefatigable researches such rich materials.

A Natural History of the Animal Kingdom, being a Systematic and Popular Description of the Habits, Structure, and Classification of Animals, from the lowest to the highest forms, arranged according to their organization. By W. S. Dallas, F.L.S. One Vol. 8vo. Houlston and Stoneman, 65, Paternoster Row; W. S. Orr and Co., Amen Corner: London, 1856.

This volume, as is explicitly stated in the preface, is a portion of the second and third volumes of Organic Nature in the Circle of the Sciences, reprinted here, in a separate and complete form. No pretensions are made on this behalf to originality; but the compiler has made good use of works of standard character, his obligations to which are distinctly acknowledged, and has exhibited the results, so far as they can be accepted as mature, of recent investigations, in advancing the classification of the lower tribes of animals especially; and this in a manner which contrasts to no small advantage with some contemporary works of more original research and higher scientific pretension. As Mr. Dallas has so emphatically acknowledged his obligations to "the excellent Zoologische Briefe of Professor Vogt," it is fair to remark that he has transferred from those pages none of the sciolism of flippant infidelity which renders the Zoological Letters, with all their merits of diligent compilation and lucid arrangement, unfit to be placed in the hands of the young in particular. The figures of Mr. Dallas's book, copies mostly from familiar stereotyped patterns, are better executed, in general, than those Vogt has given. When we say that two-thirds of the volume are devoted to the Vertebrata, it will be evident that many of the lower forms must be dismissed with a flying pen. We should have doubted whether such a proportion represents the actual division of study and interest between the several branches of the animal kingdom. It is to be remembered, however, that the work was framed as a portion only of a popular cyclopædia, and is to be judged as a bookselling speculation; not intending by the term any slight towards the judgment of a class, with some of whom have originated schemes at once bold and wise, which have fructified to the benefit of authors and the reading public, even more than to the originators, when

these have been immediately and personally successful. The embellishments of the volume we set down entirely to the bookseller's account, as out of the sphere of criticism. In the portion which is more particularly the author's—the generalities on zoological classification—we miss somewhat of the precision and force we should have desired and expected from Mr. Dallas's pen. His definition of species, for instance, absolutely necessitates such a saving clause as is appended to it—"if definition it may be called." But surely another definition is not unknown to the author, which involves neither the logical duplicity, nor the positive inapplicability, of that which he has offered. The very complete index which closes the volume is illustrated with the etymological roots of the technical names, a plan which has its use in recommending to English readers the often happily significant and universally accepted terms of science, in place of the vernacular names arbitrarily imposed on unfamiliar objects, which so often have neither usage, sense, nor sound in their favour. But the orthography in this part, employed to represent the Greek letters, betrays a want of consistency, which a moderate degree of care would have prevented, and which seriously obscures the evidence of the explanations.

JUNE: A BOOK FOR THE COUNTRY IN SUMMER TIME. By H. T. Stainton. 8vo. Price 3s. 6d. London: Longman and Co.

THIS little volume comes before us with a cover of blue and gold, bright as the cloudless sky of a June day at noon and sunset. The title is a taking one. Who is there who does not find delight in June? Who is there who would not like to possess "a book for the country in summer time?" The name of its author, as an accomplished Entomologist, is well known, and has, on more than one occasion, already appeared in our pages, in connection with some of his previous publications ("Entomologist's Annual," "Entomologist's Companion," &c.).

Our readers will naturally enquire, "What is it all about?" The table of contents in part answers that question; for there we find "June in Scotland," "June at the Lakes," "June in Devonshire," in Sussex, and in the neighbourhood of London; and in turning over the leaves we meet notices of these various localities, reminiscences of little events in the visits to each, and notes of natural objects observed, especially insects. The entomological "vein," in point of fact, "crops out" everywhere; and mixed with it we have moralisings on a variety of subjects, even upon the evils attendant upon going into debt, and living beyond our incomes. On

the latter topic we would hope that the amiable author is misinformed, when he speaks of it as "the normal state of three-fourths of mankind."

The book is, in the main, a pleasant book; it is pleasantly written—it brings before us pleasant images—depicts pleasant scenes—awakens pleasant trains of thought, and imparts, in a pleasant style, much that is pleasant to know. It is one of that class which admits of being taken up for half-an-hour, put aside, and resumed in like manner. It is suited for a June day, when we desire what is pleasurable, and avoid what is laborious.

But the question arises, does the book seek only to please?—has it no higher aim?—is there no special purpose for which it has been composed? There is a higher aim, and a special purpose—one that enlists our sympathies and commands our entire approval. "The object of the following pages," says the author, "is to show how much the pleasures of country life may be increased by some acquaintance with the various forms of animal and vegetable life with which we are surrounded."

This idea is not formally and continuously inculcated; it is *suggested*. There are pleasures both in the acquisition of what is new or rare, and in the recurrence of well-known objects in widely separated localities. These joys—innocent, cheerful, and invigorating—are jewels of great price to the naturalist; but they are "gems hidden from the world beside;" and the reader of the volume is gently led to ask himself, "Why should not these enjoyments be mine? To reach to them, if I can, is a clear gain; for I should then continue to possess all I now have, and acquire all these in addition."

Mr. Stainton does not, however, stop here. He justly remarks—"The amount of pleasure which may be derived through life by an initiation in childhood into the mysteries of Natural History, is more than we are justified in withholding from those whose education devolves upon us. Unfortunately, it too frequently happens that those who ought to instil this love of nature are themselves ignorant of such matters: their own education has been neglected, although they know it not." An excellent letter from the *Athenæum*, p. 55, calls attention to such points: and one from the Rev. Joseph Greene, page 59, meets our concurrence so entirely that we regret our space forbids its being quoted in full.

Perhaps, however, the same principle is nowhere put forward by Mr. Stainton more happily than in the contrast he gives of the formal walk of the pupils at a girl's school, and the animation and interest they exhibit when a little taste for botanical pursuits has been infused among them. For this we must refer our readers to the volume itself; which closes with an extract from our pages in perfect harmony with the views and opinions which this little publication is intended to disseminate.

SHELLS AND THEIR INHABITANTS. The Genera of recent Mollusca arranged according to their organization; by Henry and Arthur Adams. London: John Van Voorst, Parts 18 to 24, viz.:—from 1st November, 1854, to 1st November, 1855. Price plain, 8vo., 2s. 6d.; royal 8vo. Animals, plain, 5s.

WE think this very useful manual of recent Mollusca is not as generally known as it deserves, and it may not be altogether useless to give a brief sketch of Messrs. Adams' plan. About seven parts are published each year, containing some 32 pages of letter-press, and from four to five plates. The characters of the various classes and sub-classes among the Mollusca are given in the order of their presumed affinities, accompanied by descriptions of the families and genera. A list of the species is affixed to each genus, with a figure of the typical one. The authors seem to ignore malacological distinctions in forming their genera, though they give them their due place when noting the peculiarities of the families. We think a work of this description a most invaluable one to either the Conchologist or Malacologist (we regret that the English language has no one name to combine the two).

In order to get a comprehensive view of the natural affinities of the great sub-kingdom of the Mollusca, one must have marshalled before him all the information that can be obtained upon the subject; and while the difficulty, not to speak of the irksomeness of the task, of collecting the varied communications made to learned societies, or to various serials, prevents this task being accomplished but by the few; the many, by the publication of this work of Messrs. H. and A. Adams, have it accomplished for them, and may sit down and form theories, if they like it, on the facts that have been faithfully collected by our authors. It is, however, no easy matter to form a theory. We believe that in the kingdom of nature there exist individuals which owe their existence to the pre-existence, at one time or other, we care not when, of a pair of beings like themselves. These we designate as species, and these species are for the most part allowed to approach each other, like the links in one vast circular chain—the one becoming more like the other, while each preserves its special identity. Now, if these gradations really have existence in nature, the more of these links that we are able to fit to each other, the nearer will we arrive at the period when the last one may be inserted, the chain once for ever closed, and we be permitted to look on and see with a charmed eye the perfection of the Almighty's work, and admire how each little atom finds its allotted place in the circumference of these flying wheels. We believe there never was a naturalist yet that did not believe in the existence of order in the great kingdom of nature, though as much cannot be said for the kingdoms of

this world. The idea seemed to be a sort of intuitive perception, and each and all have applied themselves to find out the history of the various species that inhabit our globe—to find out from them their local habitation and to give them their names. This task, though a difficult and tedious one and not to be accomplished as the result of one life-time, nor perhaps of a century of life-times, still has its own rewards, and each one must feel a pleasure as he places one or more rings to the cable that is to bind the now scattered families of the earth together.

Although much has been done, with these intentions, since the days of the immortal Linné or Cuvier, still we hold that the day is yet far distant when the work is to be completed, and we would still work on. Your work may and will obtain data for theories; but the time for the latter has not yet come. Under these impressions we welcome the work before us, not as being one by any means that sets at rest the question of affinities or kindred organizations; the "ifs" and "buts," the "unsettled considerations," of such men as Blainville, Cuvier, Milne Edwards, and of our authors themselves, forbid us to do this;—but we welcome it as a true record of what has been hitherto accomplished in this line of investigation, and because it sets before us in a clear and lucid way the present state of the Molluscean science.

We do not pretend to have studied the whole of the seven numbers that lie beside us; but we have opened them here and there, and found ourselves pleased as we discovered gaps filled up by the discovery of some oftentimes minute creature, which, in ignorance of its existence, we were vainly endeavouring to do without; and at other times we have been disappointed as we found this and that genus out of what we thought its right place, and in that position that doubtless satisfied Messrs. H. and A. Adams; these doubts and fears proving that by no possible means could either we or they find, under the present circumstances, a mutually agreed on spot for it to rest in.

One such class we would particularize, the Heteropoda. A truly wandering race this—spending its time a marauder on the high seas; not one of them formed for crawling on the earth, nor yet for creeping on the bed of the sea. They pass their time floating listlessly on its surface (Ianthina), supported, perhaps, in some slight degree, by their curious float, which is regarded by some malacologists as a modification of an operculum (a body present in Macgillivria, Atlanta, &c.), but by Clark as a membraneous vehicle of the contents of the ovarium and matrix—or swimming rapidly about (Atlanta), disporting themselves towards nightfall, scanning every object in their reach, and, when fatigued, anchoring themselves to the first thing they can lay hold of, by a small sucker which is attached to the fore part of the ventral fin. This

sub-class has been a puzzle to all theorists; its natural affinities have appeared clearly to none of them; and we find many eminent names differing widely as to where it should be placed. Messrs. H. and A. Adams say that "unwilling to separate the Branchiferous tribes, which undergo a metamorphosis, and live in the water, from the Pulmoniferous mollusks, whose young are like the parent, and which respire the free air, we have preferred to view the Heteropods as an independent sub-class between these two great divisions." Now, we would recommend the authors, if they think this opinion of theirs likely to be the adopted one, to read the 456-7 pages of Mr. W. Clark's British Marine Testaceous Mollusca. "Conchology," he there says, in all the triumph of victory—"*Conchology* could never have settled this question: without the assistance of *Malacology* these tribes would always have remained wanderers, and be indefinitely the sport of hypothesis;" and then, with much apparent satisfaction, he places Ianthina in an united anomalous group immediately abutting on the Muricidous tribes. Well, even with the help of so much assurance, we still incline to believe that this class must still remain nomadic, must still be wafted hither and thither by every wind that blows, and is likely to be drifted by the various currents on all shores; happy will it be when, Atlanta-like (we refer to one of the genera), it can anchor itself safely and securely in some quiet corner of the Molluscean group. Then some future Wiseman will laugh at our varied attempts to place our ideas standing upright upon their narrow ends.

The plates of the typical species of each genus are delineated by the authors, and are very faithful representatives of nature. It would be unfair not to expect mistakes to be made in a work of such an extensive character, but we have detected none of any vital importance; a few that we have lighted upon might have been avoided, such as representing Ianthinidæ as having a proboscidiform head, when both their neck and head are very short, though capable of evolving a retractile proboscis.

We shall watch with unfeigned pleasure the progress of this work, which we see by the last number (xxv.), just received, has entered upon the Conchifera, and wish the authors the success that their endeavours deserve.

An Introduction to Entomology; or, Elements of the Natural History of Insects. By William Kirby, M.A., F.R.S., F.L.S., Rector of Barham; and William Spence, Esq., F.R.S., F.L.S. Seventh Edition. One vol. 8vo. Longman, Brown, Green, and Longmans: London, 1856.

No work in the English language, we believe, has done more, than Kirby and Spence's learned and popular Introduction, to spread the taste for Natural

History at home, and to extend for it the sphere of observation, from the more conspicuous but limited field which the Vertebrata afford, to the countless species and more varied history, transformations, and instincts of the Annulata, and thence indirectly to all the lower forms of animal life. Nor has its popularity been limited to one tongue or country; but, either through the medium of translations, or by the obvious influence which it has exercised ever since over the most esteemed elementary books in other European languages, the impulse given has been propagated externally in a widening circle. In noticing this new edition, however, it is with home readers we have to do, and especially with the young, who enjoy a privilege that we of a former generation were debarred from, in being early admitted to fields of instruction and delight, which sometime were strictly fenced off from the narrow penfold of "general education." If the influence of the work, in its previous comparatively costly form, has proved so eminently expansive, we cannot doubt that the effect will be vastly greater, now that it is brought within the class of ordinary school or gift-books, in bulk and in price. We copy the advertisement prefixed to this the *latest*, but, we confidently augur, *not* (by many) *last* edition; as it can scarcely have a better recommendation than that accurate and unpretending statement. "This work is now published at one sixth of the price of the sixth edition, so as to bring it within the reach of all desirous of becoming acquainted with the natural history of insects, and thus carrying out more effectually the object of the authors—that of introducing others to a branch of science which they had found so delightful. Though compressed, by a smaller type, into one volume, it contains every line of the sixth edition, which includes much matter not in the five preceding editions; and to render the work more complete, the account of its origin and progress, furnished by Mr. Spence to the life of Mr. Kirby, by Mr. Freeman, is with his permission given as an appendix."

The book is indeed a marvel of cheapness, considerably more than six hundred closely printed octavo pages for five shillings; and if, as we understand to be the case, the sale of the former editions in Britain has exceeded three thousand copies, we may well expect that the two thousand of the seventh will quickly be sown broadcast over the country. To our readers, old and young, parents, children, teachers, respectively, we say "buy and read," enjoy, verify, and enlarge, by the use of your own eyes and faculties, the curious details in rural economy, animal biography, and mental philosophy, amassed with so much study and personal observation, and digested with equal taste and judgment, by the learned authors, indissolubly associated in fame and remembrance, as they were in life-long friendship

though now for a little while separated by a temporal change. To the survivor of the two we owe a very charming addition to the volume, in the shape of letters and recollections connected with the first conception and progress of this work, and the cordial friendship which, having originated and matured the undertaking, so long survived its completion and participated its success. The chapters supplied by Mr. Spence formed, indeed, the cream and essence of Freeman's Life of Kirby, and we cannot suppress a regret that the memoir of the patriarch had not emanated wholly from a spirit so congenial. We could refer even to an incidental sketch by a passing visitor, but one well able to appreciate the subjects of his vigorous pen, that renders more pleasingly and, we think, more justly, the traits of Kirby, the Christian philosopher and minister of the Gospel, than the full-length portrait of the rector of Barham, discoloured in part by the jaundiced temperament of his biographer.

A Re-arrangement of the Nomenclature and Synonymy of those species of British Coleoptera which are comprised under the sections Geodephaga, Hydradephaga, and part of Philhydrida; Being the first portion of a General British Catalogue. By J. F. Dawson, LL.B., and Hamlet Clark, M.A. London. 1856.

Since Curtis' Guide and Stephens' Nomenclature have been out of print, the want of some complete list of British insects, for labelling collections, and for reference in correspondence, has been often complained of, and still oftener felt. The number of species added subsequently, as well as the approximation made to a better agreement between British and Continental Entomologists, as to the nomenclature, in certain families, seem to demand a revision of the whole. But as this is a task for which scarcely any individual among us, perhaps, possesses the means and the knowledge requisite, we have to hope for that result only from the gradual and separate elaboration of particular orders and families. Of all the orders, the Lepidoptera have been most attended to of late, under this point of view. We are glad to see a commencement made with the Coleoptera also, even by such fragmentary lists as this one, derived from Dawson's Geodephaga Britannica and the Rev. Hamlet Clark's Revision of the British Water Beetles, in the later numbers of the Zoologist.

A comparison of this catalogue (which fills ten three-column pages) with the older lists serves to show, in a comprehensive form, how much progress has been made, as regards these families, in reducing spurious species, and settling the nomenclature on fixed principles of chronological precedency and scientific propriety. Mr. Dawson, in particular, has been

sedulous in restoring the neglected or misapplied trivial names of the Linnean age, and of that immediately succeeding, to their rights, from which they had been carelessly deposed in favour of later intruders. Something yet remains to be done in that direction; and even now we could specify a dozen names of the last century, still awaiting the recognition of their legitimate priority, within the scope of the present list.

A perfect agreement of opinion as to what are genuine species, and what mere varieties, must be a work of time, if it be even so ultimately attainable. Thus, circumspect as Mr. Dawson has shown himself, sometimes almost severe, as to the admission of species, we were rather surprised to see Cicindela maritima Dej. figuring as a species, almost at the head of the list. The evidence Schioedte has adduced seems quite conclusive against the distinction of this even previously questioned species; and the authors of the contemporary Faune Française unhesitatingly take the same view. On the other hand, Mr. Clark, in reducing the multiplied species of *Heterocerus* to three only, in the British islands, has excluded one, *H. femoralis* Ksw. (wherewith we identify also H. arenarius of the same), which we are unable to refer to any of these three, and which is not noticed among the synonyms he has given. The array of synonyms seems to have been designedly limited to those most likely to be of use to British students; but we have sometimes found ourselves at a loss to determine on what principle the selection has been made. Here and there, a variation from conclusions adopted in the GEODEPHAGA BRITANNICA shows that the list is not a mere extract, or index, but has received an independent revision at the hands of the authors. We hope soon to be in possession of a corresponding list, which is still more urgently called for, of the Brachelytra, as the result of the investigations now in progress by Messrs. Waterhouse and Janson. Meantime, we can safely recommend Messrs. Dawson and Clark's list, as an example of what is wanted, and as incomparably the best extant for the use of British collectors, as regards the families which it comprehends.

THE WORLD OF INSECTS: A GUIDE TO ITS WONDERS. By J. W. Douglas, Secretary to the Entomological Society of London. London: John Van Voorst, Paternoster-row. 1856. Price 3s. 6d.

PRACTICAL HINTS RESPECTING MOTHS AND BUTTERFLIES, with Notices of their Localities; forming a Calendar of Entomological Operations throughout the year, in pursuit of Lepidoptera. By Richard Shield. London: John Van Voorst, Paternoster-row. 1856. Price 3s.

IN these little volumes two well-known naturalists aim at supplying instruction, in a popular form, to different classes of men. The former is addressed

to those who make necessary application to business an excuse for doing and caring for nothing else, and are often, in consequence, devoured by *ennui* when any circumstance interferes with their routine of life, and at the same time are too ignorant of pleasures yet untasted to have any relish for them. For the edification of such worthies, Mr. Douglas exhibits, in a kind of literary magic lantern, or series of dissolving views, a few scenes from the insect world, vividly, racily, enthusiastically, as they deserve, but with no great attempt at order or arrangement. Those who are or think themselves to be too busy, too dignified, too careless, or too silly to take any interest in the world of insects, are all in turn assailed, tempted, coaxed, warned, or otherwise worked on. Occasionally, we fear, he falls into a mood rather too technical for a large proportion of his readers from these classes. Such portions he must expect them to clear at a leap, learning of the fleas to whom he early introduces them; but the greater part is very readable, even by the most impatient of the scientific and the dry. We have said that Mr. Douglas has not greatly affected arrangement; a little less irregularity might have done no harm. For example, an outline of the generally received metamorphotic classification is a very good and laudable thing; but when, some pages forward, we find the author "hoping" the terms species, variety, genus, &c., are understood, and fearing that they may not be, "trying to explain," we involuntarily ask ourselves how much wiser these readers are supposed to be for the previous classification, with its sesquipedalian nomenclature and distinctive characters. What could they make of the oracular information that the classification under the heads of complete and incomplete metamorphoses is not very accurate? unless they partake of the interpretative genius claimed by a poor old man whom we knew a few years ago, who, when asked what he made of the Greek quotations in a book of old sermons of which he had become possessed, answered, that "indeed they were main grand words, but when he looked hard at them he always fancied that he knew what they meant." Some method, however, Mr. Douglas has, and not a bad one, for his particular object; he classifies not the insects, but their world—"The House," "The Garden," "The Fields," "The Woods," and so on, not omitting "The Sea-shore," each habitat monopolising a chapter, within which limitation he follows, in other respects, pretty much the fancy of the moment. The design of the other book is very different and more circumscribed, being confined to Lepidoptera, and practical hints relating to their localities, the mode of discovery, capture, rearing, and the like. To the uninitiated it would be in the main unintelligible and uninteresting; to the young Lepidopterist, possessed of a fair share of book knowledge, but small

practical experience, for whose help it is designed, it will be a boon. Enthusiasm of suitable amount, and such postulates, are, of course, taken for granted; his one longing is to collect Lepidoptera in all stages, and to know where, when, and how to obtain them. Mr. Shield offers to be his guide and tutor, and it is no presumption in him to offer it, for he is well up to his work. If his friend, "the tyro," be especially ravished with the charms of the micro-lepidoptera, all the better for him, and all the more useful will the "hints" be, as an overwhelming proportion of the book is devoted to these, for whom are reserved all expressions of tender regard. From this volume alone it would be easy to predicate what is the author's amiable monomania. Perhaps the general utility of the book suffers a little; but we respect such devotion, and forbear complaint. To make popular reading for the *profanum vulgus* out of a book whose pages frequently flow on in long succession of notices that in such and such places such and such insects are found, may be taken, occur, &c., the whole vocabulary of discovery and capture being cruelly overworked—to weave this into popular reading, we say, would be well nigh impossible. Mr. Shield has attempted it; but not very successfully. Lengthy, rhapsodical, occasionally sentimental, addresses to the country and the seasons (suggested, it may be pleaded, not unnaturally, by the division according to the months, which has been adopted to make the work a compendious "Calendar of Operations throughout the Year"), wearisomely minute directions for going hither and thither, when some definite goal has to be reached, which even "a tyro" could attain to by asking the way—many of these passages might be noted by a future editor as "*uncis inclusa*," without injury to the design or its execution. There is also in both these volumes a good deal of 8 or 10-footed prose, interspersed with several fragments of decent versification, and here and there a splendid exception of true poetry. To the second of these classes may be referred a passage, now terribly hackneyed, for which, were not the obvious pun which it contains likely to prove too strong a temptation for the entomologist of this generation at least to forego, we should pray that it might be allowed to retire from public life on a good service pension; we mean, of course, the lines about our "Friend the Weaver." We may be allowed, in passing, to correct two misquotations, one in each work. In page 39 of the "Practical Hints"—"Thus justice, while she works at crimes." For "works," read "winks." It is a famous quotation from Hudibras, which we are the more bound to set right, as we fear that a misprint in our number of October, 1854, may have misled the author. Mr. Douglas, who seems so fond of poetry, old and new, and whose just appreciation of glorious old Spenser particularly

pleases us, should never have committed such a *lapsus calami* as to represent the fable of Chevy Chase as a naval engagement, and Witherington as an "old sailor," whose "legs were shot away," the touching original of which history is so little known in its oldest and best form that we crave the indulgence of being allowed to quote it:—

> "For Wetharryngton my harte was wo,
> That ever he slayne shulde be,
> For when both his leggis wear hewyne in to,
> He knyled and fought on hys kne."

One or two passages there are to which we object on graver grounds; but disliking preaching out of season, we will but note a few and pass on. "World of Insects," page 55—a few remarks on education, a grave subject, touched in a strain worthy of our present Premier. "Practical Hints," pp. 88–91—an extract from Dr. C. R. Goring, parts of which seem to us to be in bad taste, unphilosophical, fallacious as to argument, and irreverent in tone, though, doubtless, well meant. The intimation, also, at page 8, of the author's habit of making Sunday a day for collecting-excursions we are far from commending. There is one class of observations, however, of frequent occurrence with which we cordially sympathise—viz., his caustic denunciations of that pseudo-scientific crew whom he terms "unprofitable companions," and the hucksters, pedlars, and jews entomological, who study for pride and usury's sake, not for genuine love of science and the improvement of their fellow-men. The account of the author's adventures on Wimbledon Common in pursuit of the larvæ of Peronea Hastiana, pp. 144–149, is instructive in more ways than one. There is, perhaps, no single feature in the book calling for special notice in a cursory review, its general character being simple and uniform—viz., a catalogue of the more desirable Lepidoptera to be found in each month, with their respective localities, interspersed here and there with a few practical hints as to discovery and capture, or a description, perhaps, of the mines, cases, or retreats of the smaller larvæ, with the same interest. Very few details of their economy are furnished, this being without the scope of the work. The instances of the lichen-feeding larva of Bryophila perla, extracted from the Trans. Ent. Soc., and of Phorodesma Smaragdaria, are pleasing exceptions. One or two yet unsolved problems as to the food of certain larvæ are propounded, e.g., Œcophora grandis (though this is probably virtually solved already in favour of rotten wood), Peronea Cristana, and others. This book and Mr. Douglas's are so dissimilar in object and general character, that they do not admit of comparison, and it is only accidentally that they at any time touch for a moment on the same subjects.

Mr. Douglas having a wider range, presents us with greater variety, and many interesting questions are started as deserving investigation, which promise a rich reward to any one who shall fully and once for all clear them up. The most interesting of these is, beyond doubt, the generation of Aphides, which, while largely quoting from the recent publications of Dr. Burnett, he considers to be a subject not exhausted.

The volume is enlivened by copious extracts from the Letters of Rusticus —a publication at once singularly useful, practical, and amusing, written in a sparkling, lively style, deserving of all praise. The remarks on different kinds of blight, "on the gooseberry grub," "the burying beetle," &c., drawn from this source, are admirable in their way; and from the published investigations of Mr. F. Smith we have long and highly interesting extracts relating to bees and ants. In fact, unreserved freedom of quotation from the graphic narratives of others, particularly of actual observers of what they describe, is a privilege freely claimed and candidly acknowledged by the author, and used judiciously and effectively in all cases; and we are much mistaken if his readers will not thank him as cordially for the transcribed as for the original parts of his book, and this is saying a good deal for both the one and the other.

Both the volumes that we have noticed are likely to do good service in their different spheres, and we have derived pleasure from both. Their merits pertain to their essence; their failings are but accidental; whilst a spirit of frankness and good-heartedness, not devoid of yet higher feelings, runs through both, which may well cover a multitude of comparatively trifling imperfections.

HANDBUCH DER ENTOMOLOGIE, VON HERMANN BURMEISTER, M.D., ETC. 8vo. 3er—5er Band. Enslin: Berlin. 1842, 1844, 1847, 1855.

AN intimation, in the preface to the recently published volume of Burmeister's Manual of Entomology, that it is likely to be the last, although completing only the first half of the Lamellicorn beetles, has determined us here to notice collectively the volumes of that series, which have appeared at intervals from 1842 up to 1855. We need hardly say that the eminent qualities of their distinguished author—learning, patient research, the diligent accumulation of materials, and a philosophic grasp of intellect, in the arrangement and use of them, have not been disparaged in his treatment of a subject which has already employed some other of the acutest minds among the naturalists of modern times. Not less creditable to his heart

and head is the generous and grateful testimony he has borne to the ungrudging aid and cordial reception that he found in this and other countries of Europe, which he visited in the course of the exploratory studies necessary for the work he had undertaken. Among the petty squabbles of little minds, which sometimes ruffle disagreeably the lighter surface of the "scientific world," it is refreshing to have such a hearty attestation of the genuine and disinterested sympathy which, we trust, deeply imbues the greater peaceful mass, and shines so pre-eminently in the unfading wreath that encircles the most honoured and the dearest names in the realms of Natural History.

The modifications which Burmeister's views of classification have undergone, both as to the orders of insects in general, and the family of Lamellicornia among the Coleoptera in particular, are very suggestive of instruction, appearing, as they do, to be rather the natural developments of a principle, determined by different degrees of evidence acquired, than vacillations of judgment, such as we trace in the successive varying arrangements of Latreille, high as we estimate *his* rank among the founders of genuine entomological science. In this article, however, we shall confine our view to the later volumes of the Manual, and to the arrangement of the Lamellicornia, the broad lines of which, laid at first in close accordance with the views of the illustrious author of the Horæ Entomologicæ, have, in the sequel, converged so much more nearly towards the plan traced out by Erichson, that the close concurrence of two such accurate observers and sagacious reasoners may be considered sufficient to supersede the division drawn by MacLeay, according to the difference of nutriment and of the oral organs (Thalerophaga and Saprophaga), in favour of another, founded chiefly on the segmentation of the abdomen, and the position and relative development of the spiracles which open in that region of the body. Thus, Burmeister's two grand sections, Phaneropyga and Stegopyga, nearly correspond to Erichson's Pleurosticti and Laparosticti, the *Xylophila* (*Oryctes*, &c.) being in both transferred from their place among MacLeay's Saprophaga to the association with his Thalerophaga. The principal difference between Burmeister and Erichson is in respect to the *Glaphyridæ* (the group somewhat modified from that instituted by MacLeay), which compose for Burmeister the main body of the Anthobia, the second family of the Phanerophyga; while by Erichson they have been associated with his Laparosticti. Of the other families of that first section, the Melitophila B. correspond to the Cetoniadæ E., the Xylophila B. to the Dynastidæ E.; while the Phyllophaga B. comprehend the Melolonthidæ E. and Rutelidæ E.; but in the further

analysis of this group there is a divergence between the two methods, as Erichson's MELOLONTHIDÆ, along with the PHYLLOPHAGA CHAENOCHELA B., embrace the group *Farinosa* of the PH. SYSTELLOCHELA B.; the remaining group, *Metallica*, nearly corresponding to the RUTELIDÆ of Erichson. Of the second great section, STEGOPYGA B. (answering to the LAPAROSTICTI E., after the subtraction of the *Glaphyridæ*), the PECTINICORNIA B., form a definite group with Erichson likewise, as with nearly all authors. The COPROPHAGA B. correspond to the COPRIDES E., the STERCORICOLÆ B. to the APHODIIDÆ E.; while the ARENICOLÆ B. comprehend the remaining four families of Erichson, which, however, by him, are not placed in such continuous succession as to justify our considering the coincidence as a complete systematic correspondence.

With respect to the constitution and connection of the minor groups, the differences between the two are naturally more numerous, and the want of uniformity, in the gradation apparently, palpably in the nomenclature of the subdivisions of Burmeister, arising, probably, from the length of time that has elapsed, and the accumulation of materials during the progress of his work, renders a closer comparison of the differing arrangements somewhat less facile, or less interesting, than it might otherwise have been deemed. We may note that the *Liparetridæ*, of whose antennæ the peculiar structure is noticed in a brief extract below, are not advanced by Erichson to the distinct rank which they assume in Burmeister's arrangement, and which that peculiarity may seem to corroborate, but are treated as a portion of the MELOLONTHIDÆ.

In addition to the full and particular characteristic placed at the commencement, with the history of the progressive classifications of the family, Burmeister has given two supplementary essays, anatomical and physiological; the first regarding the organs of stridulation of the XYLOPHILA, and their weight in a systematic point of view; the other a collection of data, among the most important and curious which we possess, concerning the structure and inferred function of the antennæ, organs the special development of which is so eminently characteristic of the Lamellicornia. The main points, in a brief generalization, seem to be these. In the PHANEROPYGA, in general, the reciprocally contiguous faces of the joints of the capitulum are beset with minute deeply excavated pores, filled up by glassy papillæ of various forms. The horny epidermis between the pores is never clothed with hairs, but presents only a fine cellular sculpture. The most common form of the papillæ approaches that of a young fungus before the pileus is expanded. There is often a central impression at the base as well as apex of the papilla, contracting the axis; but never to the

degree of an actual perforation. The pores of the opposite surfaces of the intermediate joint, or joints, correspond so nearly, though not completely, as to produce to a great extent the appearance of perforations of the substance of the joint. The pores are largest in proportion, and the structure, therefore, most easily to be investigated in some of the *Glaphyridæ (Glaphyrus, Amphicoma)*; smallest and most distant in the *Sericidæ*, in which they are disposed in furrows, alternating with ridges, over those contiguous surfaces. In the *Melolonthidæ* the papilliferous pores, and the resulting cellular structure, extend in part to the external surfaces of the joints of the capitulum. In the *Liparetridæ*, an Australian group, the discrepancy is greatest, the papillæ being lengthened into pellucid hairs, as in the next section.

In the Stegopyga, a less naturally defined group, the structure of the same parts is subject to greater variations; but as far as the investigation has been carried hitherto, they all agree herein, that the joints of the capitulum are covered on all sides, and especially on their contiguous surfaces, with pores which bear *capillary* glassy papillæ. The length of these, however, varies in the different groups. In *Bolbocerus* there is observed a very peculiar condition of the space between the pores, which has, alternating with the hairs that clothe it, other excavations, lined with a glassy coat, and surrounded at the rim with a circle of hairs, which, converging, form a conical cap; but on the inner contiguous surfaces of the joints these hairs are too short to meet, and compose merely an annular fringe.

Burmeister, after a minute investigation of the structure thus concisely indicated in general, and a discussion of the collateral arguments, decides unhesitatingly in favour of the theory which attributes to the antennæ of insects the function of smell.

The Natural History of Ireland, in four volumes. Vol. IV. Mammalia, Reptiles, and Fishes; also Invertebrata. By the late William Thompson, Esq. 8vo. London: Henry G. Bohn, York-street, Covent Garden. 1856.

The interval of five years, which has elapsed between the publication of the third volume of Thompson's Natural History of Ireland and this posthumous volume, is sufficiently accounted for by the circumstances under which it appears. The author had provided, in case of his own decease before the completion of his task, that the materials he had been accumulating for so many years should not be lost to science, by the appointment

of two valued friends, themselves zealous naturalists, as his literary executors. But of them, also, one was called away by death before their office was at last fulfilled. From the survivor, the amiable author of "Zoology for Schools," &c., we have an account of the circumstances under which their editorial duty was undertaken, and the manner in which it has been executed.

Mr. Thompson's papers were found arranged, as might, indeed, have been anticipated, with the most perfect method; but they were the mere materials of the future work—notes made at various times, letters, or extracts from such, references to his journal, or to published books:—

"The notes were written on paper of the most miscellaneous description, and occasionally on slips so small that six or eight lines were crowded into a slip not exceeding an inch in breath. . . . How was the information embodied in these notes to be written out? It was desirable to use, as far as possible, the very words that Mr. Thompson had employed. The book should be his composition, not ours. Yet, to give the world the hurried jottings of the moment, and the unrevised memoranda of successive years, could not be thought of."

This extract may indicate some of the difficulties which the editors had to deal with, and which, guided by a sound discretion and affectionate remembrance, and justified by directions in his own handwriting on this subject, they have surmounted in a manner which deserves our grateful acknowledgment, anxious as we have felt that those scientific fruits of years, the existence of which we knew, should not be lost through the untimely stroke that had withered the hand that wrought them.

We do not look to find in this posthumous volume the matured results, the chastened yet glowing style, that marked the previous volumes, touched and retouched by the author's hand. Still, many a detached passage, a page standing out here and there, leads us to sigh over the loss of yet other volumes, that should have arrested and enchained us, nothing loth, as the "Birds" have done for many an hour before. It is, however, for the matter, more than the form, that we accept, with mingled gratification and regret, this bequest of a name so dearly cherished.

To the materials collected by Mr. Thompson, and put into form and continuous connection by his editors, a brief memoir is prefixed of the author's life—a life uneventful indeed, but vivified by systematic energy and purpose of will, and endeared by the hearty friendship of many noble natures and names engraven on the tablets of fame—a life but little prolonged in duration, worn out, in fact, before his work finished had satisfied his own aspirings. A portrait, reduced from that of the author in Mr. Ransome's Ipswich series, recalls him to our mind's eye, as we have often seen him in the body, in those morning hours sacred to study or scientific conference,

and may to the reader serve for a speaking illustration of this sentence in the Memoir—"Many will remember the searching cross-examination to which, on such occasions, they were subjected." The love of truth—a characteristic of every true naturalist—was peculiarly awake in William Thompson, and the eminently judicial character of his mind fitted him for sifting, and weighing, and deciding on the evidence of natural phænomena, as the same would have qualified him to deal with questions of another sort, had his choice or his profession bent him thitherward. Amid the busy people of the most busy and thriving commercial town of Ireland, he was the only one who was devoted—time and talents, both and mainly—to natural science. But his industry and his methodical habits were akin to theirs; and his townsmen, not altogether strangers, either, to the attractions of literature and science in the rare pauses of intense commercial life, were proud to claim for their own the first naturalist of Ireland.

A list of his publications in Natural History, appended to this volume, extends to more than seventy distinct articles; while the number of species by him first recorded in the Irish Fauna amounts to between nine hundred and a thousand. The comprehensive range of his study was commensurate with the thorough accuracy of his knowledge. "He gave attention not only to the long series of vertebrate and invertebrate animals (except Insecta and Infusoria), but also to the vegetable kingdom in all its various forms." It may not be uninteresting here, in conclusion, to recapitulate the number of species, in each of the grand divisions of the animal kingdom, which are enumerated as Irish in the work with which, or beforehand, the labours of Mr. Thompson's life were closed:—

Mammalia (of which Cetacea and Pinnipedia 11), besides 6 extinct	36
Birds (of which a few admitted on scanty evidence)	264
Reptilia 2, and Amphibia 5	7
Fishes (of which some considered not sufficiently authenticated)	182
Mollusca (not including the Molluscan Bryozoa)	545
Insecta (enumerated by families; names of species not given)	4,440
Arachnida omitted, except Pycnogonida (included with Crustacea)	10
Crustacea 199, and Cirripedia 22, (Myriapoda omitted)	221
Annelida (besides Entozoa 143, Report of B. A., 1843; Rotifera omitted)	95
Echinoderma 55, and Acalepha 31	86
Zoophyta (Anthozoa 71, Bryozoa 96)	167
Foraminifera (Rhizopoda and Infusoria omitted)	30
Amorphozoa (Porifera)	34
Appendix, Additions to the Irish Fauna, recorded since W. T. ob.	27

To which are to be added some hundred species in Irish collections, not yet named or identified. A. H. H.

POPULAR GEOGRAPHY OF PLANTS; OR, A BOTANICAL EXCURSION ROUND THE WORLD. By E. M. C. Edited by Charles Daubeny, M.D., F.R.S., &c.; Professor of Botany and Rural Economy in the University of Oxford. 16mo. 22 coloured Plates. Price, 10s. 6d. Lovell Reeve, London. 1855.

THE manners and customs of the various races of men, their mutual communication for purposes of trade, the improvement of their political condition, and the development of their intellectual resources, are all intimately connected with the distribution of vegetable forms in the different regions of the earth. The characteristics of any country, the features of its surface, whether flat or undulating, or rugged and alpine, the nature of its rocks and soil, the gently-flowing streams or the rapid rivers which traverse it, the clearness and cloudinesss of its atmosphere; all have a share in determining, to some extent, the mental peculiarities of the human inhabitants. We must, however, add to these the vegetable productions which, characterized by their sameness or their variety, the lightness and gracefulness of their habit, their massive appearance and their sombre character, as well as the useful products they yield, contribute materially to the general impression.

The work whose title is at the head of the present article has—

"For its object chiefly, so far as it can be done in such an outline, to bring together, within a small compass, facts which have been gathered from various authentic sources, so as to convey some idea of the various aspects of nature in those different and distant regions of the earth where dwell our unknown brothers and sisters in the great human family, and to help those who stay at home to create for themselves a kind of mental picture of the sights which daily meet the eyes of those absent friends who have made a home for themselves in foreign lands."

The geographical distribution of plants has occupied, at different periods, the attention of the highest authorities in natural science; by the labours of Humboldt, Brown, De Candolle, Meyen, Hooker, and others, this branch of study has made rapid progress, and much has been elicited regarding the laws of the distribution of vegetable forms.

The "Popular Geography of Plants" will prove useful in diffusing a more general knowledge of a most interesting department of science. The classification into eight zones, proposed by the late Professor Meyen, has been followed, and a separate chapter is devoted to each. These zones are the equatorial, including 15° lat. on each side of the equator; the tropical, from 15° lat. to the tropics; the sub-tropical, from the tropics to 34° lat.; the warmer temperate, from 34° to 45° of lat.; the colder temperate, from 45° to 58° lat.; the sub-arctic (and sub-antarctic), from 58° to the arctic (and antarctic) circle; and the polar zone, including all the land beyond 72°

of latitude. At page 5 there is an instructive chart on which the limits of these zones are represented by differently-coloured spaces.

As a sample of the style in which the subject is treated, we may select the following :—

"That we may prize, at its full value, the scanty vegetation of the polar zone, let us try to forget that such a thing as a tree, or even a shrub, exists; let us place ourselves there in fancy, and look round; and, that we may properly enjoy the six weeks' sunshine, let us first imagine the state of things through the long night of winter. . . . The 'cold, round moon,' looking steadily down on all that white frozen world, never setting the fourteen days and nights together, and only hiding her face from her third to her first quarter, as if for sorrow that she could then be of so little use; but, even then, there is still the glorious aurora lighting up the heavens, and darting bright rays through the air to make some amends for the loss of sun and moon."

Then follows an account of the vegetation as it appears during the short summer of the inclement north; the species are not numerous, but of much interest to the botanist. It is, indeed, in such a latitude only that the vegetable denizens produce so striking an impression on the most indifferent spectators. Examine the journals of arctic voyagers, and observe with what intense interest—after passing a dreary winter, where only snow and ice meet the eye—they look for and note the earliest appearance of some of those plants which rapidly burst into flower after being denuded of their snowy covering. The chapters containing details about the vegetation of the different zones comprehend, also, facts of importance respecting the general aspect of different regions, and the manners and customs of the inhabitants: as we have stated in the outset, all these are intimately connected. Although not much inclined to criticise very closely a work which does not profess to be strictly scientific, yet we cannot avoid alluding to some mistakes which seem even to have escaped the notice of the learned editor. Having collected the rare and beautiful *Astragalus alpinus* in its Highland home, we had some difficulty in recognising it under the following description—"A thorny plant of the leguminous tribe, not unlike gorse (or whin) in its general character." Surely, neither author nor editor had ever seen the species. The lichen on which the reindeer feeds is described as "in appearance very much like the Iceland moss we see in druggists' shops." These, and some other blemishes, will, doubtless, be remedied should the book reach a second edition; nevertheless, those who have a desire to know some facts respecting the features of Flora in different parts of the world will find the "Popular Geography of Plants" deserving of perusal.

Next to actual inspection of the vegetable covering in various climatic zones, we may rank good panoramic views of the same, though even the best

of these are imperfect substitutes for the natural scene. Few possess such power of lucid description as to be able to convey in appropriate language an idea of the beautiful scenery with which our world abounds. There is an art, however, which has recently made rapid progress, and can be made available for the purpose alluded to—we mean photography in its different departments; and when, by its means, double pictures are taken for the stereoscope, we can bring under the eye peculiarities of Flora's features which any ordinary picture cannot enable us to realise. We need scarcely add, that some amount of botanical knowledge very materially enhances the value of all substitutes, whether pictorial or descriptive, for the real scenes.

The book which has occasioned these remarks is a useful, popular addition to the literature of the subject of which it treats. Its utility is increased by the plates, twenty in number, which are interspersed, and comprehend Lapland scenery, Australian vegetation, tropical forest vegetation, and other features of different vegetable zones.

A Popular History of British Lichens. By W. Lauder Lindsay. M.D. Reeve, London. 1856. 22 Plates. Royal 16mo.

For the correctness of the information contained in this useful manual the author's already well-earned fame in this department of botanical science is sufficient guarantee, and every beginner, and even many an advanced student, must hail the appearance, in the English tongue, of a guide to assist his researches among this exquisite family of plants. For though, during the period when natural history was believed to be merely a search after the beautiful, not the scientific, this subject was rendered "botanically odious by books;" yet, since botany expanded itself into a science, whilst almost every other department of it can boast its manuals and hand books, Lichenology remained nearly a blank, with the exception of books whose expense put them altogether beyond the ordinary student's reach. The general plan of the letterpress is most excellent. After a general preface in honour of his favourite plants, from which space will not permit an extract, but which we strongly recommend the perusal of, the author gives a chapter on the history of Lichenology, briefly reviewing the subject, and showing, alas! how backward Britain has been in the field, though one or two even of her great men have written on the subject. Next, a practical chapter on the general characters of British lichens, showing the alterations which the external form of the same species often undergoes,

and also entering into the internal anatomy of the plants—in fact, a careful resumé of all that is known on the subject. Next, a chapter on the economic uses of lichens, which are stated to be three—food, dyes, and, lastly, as nature's pioneer, to prepare the barren rock and desert island for the habitation of higher plants, and, finally, of animals. To this last theory we must express our dissent; for, though it is a pretty one and prettily handled in the book, yet we fear it must be abandoned in our present state of knowledge; for, even granting, which cannot be denied, that lichens do erode the rocks to which they are attached, and that they are (though this we doubt as an universal rule) always the first plants to take possession of the newborn land, yet, taking into account their slow growth and equally slow decay, and the minute quantity of organic matter that thereby arises, it is impossible to conceive that they can play so important a part as here assigned them; and, if the author had ever an opportunity of examining those barren rocks, in tropical regions, where lichens most love to grow, he would have found physical causes sufficient to account for the formation of soil, in the wearing effect of the sun's heat; and, though it may sound strange to our northern ears, we suspect also of the heavy night dews playing, amidst the heated tropical rocks, a part analagous to that which frost and rain play amongst the cliffs of northern and southern lands. Into the subject of the dyes derivable from lichens the author enters very fully, giving concise and simple methods for testing the value of the various species; and the importance of this family, in a commercial point of view, may be judged of by the fact that £1,000 a ton has been paid for Orchil. Next, an interesting chapter on the geographic distribution of lichens, from which it appears that many of them are cosmopolitan, and also the most extreme representative of vegetable existence, whether we arrange plants latitudinally or altitudinally. That pretty little species, Lecidea geographica, common on our Irish quartz hills, "also occurs in the arctic and antarctic regions, and is the last form of vegetable life which has been met with by travellers in the greatest elevations hitherto reached on the Andes and Himalaya." The important influences exercised by habitat over the forms of these plants is also noticed, as well as the geologic distribution of many species. We must pass unnoticed "On the collection and preservation of Lichens," and come to an important chapter on classification. The author, while, in our judgment, showing his good sense by adopting "a natural instead of an artificial classification—a classification founded on natural affinities and structural analogies, rather than one based on the reproductive or vegetative systems

of lichens exclusively," modestly adds: "We cannot advance a complete natural system of classification. We consider the distinctive marks of lichen species to be at present very imperfect and unsatisfactory, and the progress of lichenology must soon result in a complete revolution in the classification and nomenclature of British lichens. Under these circumstances we think it rather preferable only to describe the characters of typical and familiar species. We believe that an enumeration, even of the mere names of rare species and puzzling varieties, would serve only to confound and alarm the beginner, for whom this little work is chiefly intended." The authorities chiefly followed are—in the Gymnocarpous Lichens, Schorer; and in the Angiocarpous, and Graphideæ among the Gymnocarpous, Leighton's most excellent monographs.

Two hundred pages of descriptions of species follow, written in a simple and pleasing, yet sufficiently scientific style, to satisfy even the most fastidious; many useful and entertaining facts relative to the general history and distribution of the species being given. However, there is one cause of regret here for the Irish botanist, which is, the nearly total ignoring of Ireland as a station for *British* Lichens: not above a score of times is it mentioned, though once, indeed, as the only known locality for Cornicularia vulpina, gathered on Killiney Hill, Dublin, in 1842, by Dr. Jacob. This is not as it ought to be, and though, doubtless, much of the blame rests with Irish botanists, who too often remain silent concerning their labours; yet still we think that the author might have made more use of the eighty-six pages of M'Kay's Flora Hibernica on Lichens than has been done. One other fault we have to find in common with all this otherwise useful series of manuals, which is the arrangement, or rather total disarrangement of the plates, which proves a great inconvenience to any one endeavouring to use them, and which might be easily remedied by placing them all together at either end of the volume.

In every other respect we heartily recommend this little book, which we cannot but look on as a useful pioneer in the task of raising this lowly family of plants from the comparative neglect into which they have undeservedly fallen.

Insecta Britannica Diptera. By Francis Walker, F.L.S. Three vols. 8vo. London, Lovell Reeve. 1851. 1853. 1856.

The appearance of works like the present is a satisfactory proof that Entomology is daily adding to the number of its votaries; while it goes on to

embrace more and more the orders which, possessing less of the charms of colour to ingratiate them, have been, till of late, much neglected; and that the study is gradually assuming more of a scientific character. These volumes are intended to meet the avowed necessity of smoothing the way for beginners, and thus gaining friends for the science, by providing means of getting more easily at the characters, and hence at the names, of the species; so that, this first step surmounted, the taste and capacity for a deeper scientific study may have room to develope itself. This view appears so reasonable that we cannot conceive how the study of the Diptera should become popular until collectors are enabled to determine their species with much greater ease and certainty than has been hitherto possible. Accordingly, we have taken up this work of Mr. Walker's with cordial pleasure, and with the hope that it may give an energetic impulse to the study of the Diptera. Yet it has not been without hesitation that we have complied with the request of the editors, by attempting a review of it in the pages of this journal. The Diptera of Europe are as yet so imperfectly known, that in respect to them the object which Mr. Walker has proposed to himself is not only very difficult, but absolutely unattainable in any degree corresponding to the actual state of our knowledge of some of the other orders. While, therefore, we freely give him credit for what he has effected in more than one point of view, there must be, at the same time, many defects to remark. Now, in particularising these, as we are bound to do, we may give occasion for a completely false impression, as if we were seeking only to find out faults in his work, when it is our real desire to recommend it very emphatically. It will give us the greatest pleasure to see a new edition soon rendered necessary by the general and diligent use of the present one. That will not only afford a gratifying proof of the diffusion of a lively interest in Natural History, but will also tend to advance the work towards that degree of perfection which can only be reached by repeated trials, and by the help of additions and improvements, the product of the collective experience and study of many. We would venture to hope that when a second edition comes to be prepared, many of our remarks, which at present may wear the semblance of censures merely, will appear in their true light, as a modest contribution to the completion of a work to which we heartily wish the most eminent success; but which, as an attempt at a very difficult object, cannot but labour under considerable defects, in spite of all the pains that have been taken with it.

In order to have a proper rule by which to judge of Mr. Walker's book, it seems necessary to lay down some of the conditions which we have a

right to require in a work of this nature. These are partly indispensable to every scientific work on Natural History, partly requisites attaching to the special character of a Fauna. Under the former head, we may reasonably expect that the classification should not fall behind the actual progress of the science. It may justly be said, in praise of Mr. Walker's book, that here it need not fear comparison, but that as to the systematic arrangement it excels the Diptera of Sweden by Zetterstedt, admirable as this is in other respects, and that in some points it even constitutes a step in advance, and not an inconsiderable one.

The extent which Mr. Walker assigns to the order Diptera corresponds with the ideas of a certain school of Entomologists better than with the indications of nature. The combination of the *Suctoridea* (*Pulex L.*) with this order will scarcely stand the test of a close examination of their anatomy, internal and external. The remainder of the order, after the removal of these, is divided into *Proboscidea* and *Eproboscidea ;* the names are open to criticism—not so the principle of the division itself. The *Proboscidea* Mr. Walker subdivides into *Nemocera*, *Brachycera*, and *Hypocera*. But while he has seized correctly the characters which distinguish the *Hypocera* from all the other families of *Brachycera*, it seems to us that it would have been better to have treated them as a subordinate division of these, than to make of them a co-ordinate group—a rank not justified either by the number of species, or the variety of forms which they comprize, nor yet by the importance of the distinctive marks which separate them from the rest of the *Brachycera*.

The first two volumes contain the Brachycera divided into nineteen families: the number alone plainly shows that it has been the author's purpose to avoid an excessive multiplication of the families; a laudable endeavour, considered in reference to the specific object of the work. The classification does not evince as much care to fix the bounds of the families with some regard to a fair proportion between their respective contents. No doubt, nature has set limits to such an attempt, and they cannot be overstepped; but Mr. Walker might have made a closer approach to these natural limits, if he had reunited some of the smaller families, and had subdivided his immense family *Muscidæ* in a suitable manner. The last it was in his power to have accomplished, and we cannot but regret that he has declined the undertaking. The other is a task so difficult that we have no right to exact it, however thankful we should have felt to him for a successful solution of the problem.

The analytical table of the families is skilfully constructed, though it

requires some amendments. Thus, for example, in the determination of the family to which a *Dioctria* belongs, the student would be directed, not to the *Asilidæ*, but the *Xylophagidæ;* and, again, to the *Conopidæ*, instead of the *Stratiomydæ*, in the case of a *Stratiomys* with simple cubital vein. These, however, are but trivial blemishes, which may easily be remedied, and which, in the meantime, scarcely detract from the usefulness of the book.

The characteristic of the families is framed with reference only to the European species, or, more strictly, only to those indigenous to Britain. Readily as we concede to Mr. Walker, with a view to the special object for which he has written, the privilege of disregarding many peculiarities and singularities of the exotic forms, and of applying himself by preference to the characters of the native species; yet we cannot give an unqualified approval to the *exclusive* consideration of the latter. The author should have asked himself, and have answered the question decidedly, whether he proposed to give a characteristic of the families, or a mere recapitulation of the accidental distinctive marks by which the British species of one family may be known from those of another. If the former were his object—and he has given enough to make it appear that it was—then the exotic genera and species ought to have been regarded. The family character is no product of the casual fauna of a particular district, but the result of the comparative knowledge of the entire family, so far as this has been attained; not different for every country and province, but the same, and a common property of science everywhere. On the other hand, if he intended only to give the distinctive marks by which the British species of one family may be separated from those of another —and it seems that this might have been enough for the object of his book—then he was fully entitled to consider only what lay within the limits of the fauna which he had to treat of. But, then, he should have expressed this intention clearly, and adhered to it consistently. The indecision in which Mr. Walker has remained as to his own purpose has led to this result, that for those families which have numerous representatives in the British fauna, a tolerably full, and in several instances— as, for example, in the *Syrphidæ*, and more especially in the *Dolichopidæ* —a well-constructed family character is given, which approaches the more nearly to the true family character in proportion as there are found among exotic forms few that differ materially from the indigenous; while, on the other hand, for the families which are sparingly represented therein, we have, instead of this, distinctive marks applicable only to the British

fauna, which often are nothing more than generic, and sometimes sink into mere specific differences. From this has arisen a glaring and disagreeable want of uniformity, which might easily have been avoided, and therefore ought to have been so. In the construction of the family characters, the veining of the wings has not everywhere obtained the attention it deserves, as an easily observable and in general very sure guide. This defect is partially supplied by the good figures, from the hand of Mr. Westwood, which accompany the work : where this illustration is wanting, the omission is felt all the more sensibly.

Proceeding now to take up, one by one, the families of the *Brachycera* admitted by Mr. Walker, we shall briefly give the most material remarks that suggest themselves, touching their definition or limits.

1. Stratiomydæ.—Contrary to general usage, the author has united with this family the genera *Beris* and *Actina ;* an extension of it in which we concur, since these genera undoubtedly approach much closer to the rest of the *Stratiomydæ* than to the *Xylophagidæ*, with which they are generally associated by the authors who do not admit the *Beridæ* as a family by itself. It were to be desired that Mr. Walker had given greater prominence to the sub-divisions of this as well as other extensive families. This would have afforded a link of connection with other modern arrangements of the order, more interesting and more practical than the unnecessarily diffuse and quite useless repetition of obsolete family names among the synonyms. In the general character, the phrase "palpi most often clavate" is unsatisfactory; these organs might have been more correctly characterised as obsolete in some genera, three-jointed in the rest. The antennæ are described as five to ten-jointed; this is wrong, not one of the genera given by Mr. Walker having less than eight joints; and the expression, "articuli tertius et sequentes subæquales," is far from exact. The number of segments ascribed to the abdomen (five) is incorrect: in the genera *Beris* and *Actina* seven are visible; in the rest the actual number is the same, but the sixth and seventh segments are retracted under the fifth; in *Sargus* and *Chrysomyia* the seventh is at its minimum of development. To prevent misapprehension, it should have been stated that the anterior branch of the cubital vein is regularly wanting in some species; for instance, *Nemotelus nigrinus*, *Stratiomys microleon*, *S. argentata*, etc., and disappears occasionally in individual specimens, of the genus *Beris* for example.

2. Xylophagidæ.—The terminal segments of the abdomen are described as tubular in the female ; this is true of the genus *Xylophagus*, but not of

Subula. The characteristic of this family gives no information as to the extent in which Mr. Walker takes it. Something should have been said of the veining of the wings, in which the relation of the family to the *Leptidæ*, *Xylotomæ*, and *Tabanidæ* is so clearly expressed. It should, also, have been remarked that it is distinguished from the *Leptidæ* chiefly by the flagellum of the antennæ, composed of a greater number of closely connected joints; from the *Tabanidæ*, by the different structure of the mouth; from the *Xylotomæ* or *Thereuidæ*, by the development of the empodium in the form of a pulvillus; while the spurred tibiæ and the ambient costal vein separate it from the *Stratiomydæ*, to which it makes a nearer approach through the genera *Arthropeas* and *Cœnomyia*. On the other hand, the characters taken from the structure of the antennæ, which are applicable only to the two British genera *Xylophagus* and *Subula*, might well have been left out. This is one of many instances which clearly show the inconvenience of the method followed by Mr. Walker in the determination of the family characters. Supposing—what is by no means impossible—that *Cœnomyia ferruginea* should be hereafter discovered in Britain, this will require a totally different character of the family; and that again will have to be altered in case *Pachystomus syrphoides* also should occur. Where will this end, if the scaffolding on which all future discoveries are to be arranged has so little stability that the occurrence of one new genus, and even in some cases the accession of a single species, endangers its utility and makes a multiplicity of amendments necessary! What would be said of a flora in which the classes and orders were characterized after such a fashion?

3. Tabanidæ.—The wings cannot properly be termed "deflexæ," *Hæmatopota* being the only genus in which they are actually so. The antennæ are said to be six, eight, or ten-jointed: in all the genera here given they are either six or seven-jointed; in *Chrysops*, indeed, the third joint is annulated, and seems to be composed of several joints, but these are completely connate. The palpi should have been given as two-jointed in this family. An "obconical abdomen" (conical the author means) is attributed to the males—a character not applicable to the genus *Chrysops*.

4. Acroceridæ.—The size and form of the alulæ, which completely conceal the halteres, in a manner especially characteristic of the family, should have been noticed; also that the eyes are contiguous in both sexes. The antennæ are described as three-jointed, which is not true of either of the British genera; the seta in *Acrocera*, and the style in *Henops*, being a simple process of the second joint. The number of the ocelli, given as

three, is subject to this exception, that *Henops* has only two. The position assigned to the family seems questionable, after what Erichson has demonstrated of the structure of the oral organs. He has proposed for it a place after the *Syrphidæ* and preceding the *Myopidæ*, *Conopidæ*, and *Oestridæ :* much might be said in favour of this view, but more perhaps against it.

5. Asilidæ.—This family, as to the contents of which there can be no dispute, is well characterized. The proboscis, however, is not very happily described in general, as "very sharp." The veining of the wings ought to have been regarded, and the empodium, which is not developed like a pulvillus, but crowned by a single stout bristle. The phrase, repeated under every genus, "ocelli on a tubercle," belongs to the family character, not to that of any genus, being common to them all alike. The abdomen of the *Asilidæ* does not (as it is here stated) consist of seven segments, but of eight. The eighth segment in the males is ordinarily very minute, sometimes unsymmetrical, and for the most part nearly concealed. In the females it is more apparent; in those of the genus *Asilus* it is mostly modified in shape, and forms part of the compressed two-jointed ovipositor. When this consists of more than two joints, one or more of the preceding segments partake of this alteration, as, for instance, in the subg. *Itamus*.

6. Leptidæ.—This family is very insufficiently characterized. Not a word is said of the peculiar veining of the wings, of the shortness of the epistoma, or of its peculiar form; nor yet of the presence of two-jointed palpi, of terminal spurs to the tibiæ, or of the development of the empodium in the nature of a pulvillus. On the other hand, the antennæ are termed "setiformes," meaning "in setam terminatæ :" this is inapplicable to the genus *Spania*, which is here rightly referred to the family *Leptidæ*. The segments of the abdomen are reckoned as seven : there are eight of them in reality. The eighth, indeed, may easily be overlooked, on account of its small size and retracted position in the male.

7. Bombylidæ.—This family is made to include the genus *Thereua*, or, according to the antiquated mode of spelling, which Mr. Walker has retained, *Thereva*. His inducements to this coalition have probably been the hairy body of most of the *Thereuæ*, and the palpi composed of a single joint. We cannot but consider it as a very unnatural combination. If the family *Xylotomæ* or *Thereuidæ*, represented in the British Fauna by the single genus *Thereua*, is not admitted, it would be better to associate this genus with the *Xylophagidæ*, notwithstanding the different structure of the empodium and of the palpi, or even with the *Leptidæ*. Mr. Walker has

described the antennæ of his *Bombylidæ* as three to four-jointed, but immediately afterwards allows that they are five-jointed in *Thereua*.

8. Scenopinidæ.—This family, containing the single genus *Scenopinus*, is surely too narrowly circumscribed in proportion to the other families. When the junction of *Thereua* with the *Bombylidæ* has been admitted, and when such a family as his *Muscidæ* is not deemed to comprehend too discordant forms, it would have been no extraordinary step to have adopted here the simplified arrangement of Mr. Westwood, who unites the *Scenopinidæ*, *Pipunculidæ*, *Platypezidæ*, and *Lonchopteridæ* in one family. It is an old remark that what we have been accustomed to look at as systematically distinct appears to us more different than it really is; and this seems to be verified in the present instance. The affinity between the *Scenopinidæ*, *Pipunculidæ*, and *Platypezidæ* is obviously shown in the form of the ternate areolets: the *Lonchopteridæ* are more remote from these, so that the author might, without fear of censure, have excluded that family from such a combination.

9. Empidæ.—The extent in which this family is taken, comprehending the *Empidæ*, *Tachydromidæ*, and *Hybotidæ* of other authors, seems to us too great not to involve some perplexity to beginners, for whom it is to be remembered the work is intended. The author might, at least, have divided the family into subordinate groups. It seems to us that he would have done well to have treated—if not as a distinct family—yet, as a peculiar group, the genera in which the pobrachial areolet is much longer than the anal, the latter often wanting, the third longitudinal vein almost universally simple, the discoidal cell present only in some rare instances, and in which the antennæ are apparently two-jointed—in other words, the genuine *Tachydromidæ*. The remainder of this great family then falls into two groups, in the first of which the vein that closes the anal areolet is nearly parallel to the posterior margin, and the posterior angle of the wing is very prominent; while in the second the anal areolet is rounded or truncated at the end, and the posterior angle of the wing much rounded off. The limit between these two groups might be drawn in different ways. If the former of these characters is considered as the more important, the first group may end with *Leptopeza* and *Brachystoma longicornis* (a species which does not belong to the genus *Brachystoma* in the proper sense); and the second may commence with *Oedalea*, *Euthyneura*, *Brachystoma*, and thence proceed to *Ardoptera*, *Heleodromia*, *Wiedemannia*, *Sciodromia*, and *Phyllodromia*; or, if the latter is viewed as the more important character, then *Oedalea* and *Euthyneura* should be transferred to the first group,

while the genus founded on *Brachystoma longicornis* passes over to the second. The genus *Brachystoma*, in the restricted sense, indicates, by the length of the pobrachial and anal areolets, the transition to *Hybos*.

10. Dolichopidæ.—The whole treatment of this family is so judicious that it might serve as a pattern for all the rest. The very complete and carefully constructed character of the family is marked by clearness and precision of phrase, as well as by the prominence given to the really essential parts. A less vague account of the composition of the abdomen would have been desirable; and the peculiar structure of the metathorax, the concealed position of the spiracles consequent thereon, and the singular manner in which both these and the prothoracic spiracles are closed, also deserved a mention. What is said in page 146, line 3, of the structure of the second joint of the antennæ does not apply to all the species.

11. Lonchopteridæ; 12, Platypezidæ; 13, Pipunculidæ.—These three small families are sufficiently characterized. The genera *Opetia* and *Platycnema* are referred to the *Platypezidæ*; rightly, as we think.

14. Syrphidæ.—This family, so definitely separated from all others, is also well characterized here. It might have been stated that the vena spuria behind the pobrachial vein is sometimes inconspicuous, sometimes entirely wanting, and that the one before the præbrachial vein also is rather indistinct in certain genera, *Ascia* for example. A very characteristic mark of the family, here overlooked, is the unsymmetrical structure of the anal appendages in the males. That the majority of the family imbibe the nectar of flowers is questionable: quite as many species appear to feed on the pollen.

15. Conopidæ.—The characteristic of this family is particularly scanty, although the structure of the oral organs, the veining of the wings, the form of the abdomen and the legs, afford abundance of available marks. *Myopa* and *Zodion* would unite naturally enough with this family, but not so with the *Muscidæ*, as they are here placed: this Mr. Walker himself admits in the addenda to the third volume.

16. Muscidæ.—The second volume opens with this family, which has here a greater extent than we can approve of. Accordingly, it embraces so many variations of structure, that the characters given are necessarily very scanty, and will scarcely help a beginner much. What the author means when he terms the wings "confertæ" we do not understand; and it is to be observed that the posterior angle of the wings is not by any means rounded off in all the genera. One of the few characters universally applicable to the family has been omitted; that is, the preponderance of the dorsal

plates over the ventral of each abdominal segment, in particular genera resulting in the total disappearance of some, or even all the ventral plates. This character deserved notice the more as it would have supplied available marks for the distinction of the sub-families.

According to common usage, the author divides the family *Muscidæ* into the groups *Calypteræ* and *Acalypteræ*. He might have chosen a character more natural and more free from ambiguity, for beginners especially, if he had constituted the first group of all those genera in which the præbrachial vein takes an angular course forwards, or is bent towards the cubital vein, not merely converging to it; and had left in the second group all in which this is not the case. The point of contact of the two groups lies between the genus *Cyrtoneura* and certain *Anthomyiæ* in which the præbrachial vein is bent forwards at the end. In order to draw the line more precisely, these last mentioned species might very properly be transferred to the genus *Cyrtoneura*, where they would stand quite as well as in *Anthomyia*. The occurrence of some species of *Tachina* with abbreviated præbrachial vein is no material objection to such a division; which, however, is only applicable to the indigenous fauna, as there are exotic genera allied to *Dacus* and *Platystoma* in which the præbrachial vein ends in the cubital.

The group *Calypteræ* (the *Myopides* being excluded, as belonging to another family) is divided by Mr. Walker into the sub-families *Tachinides*, *Dexides*, *Sarcophagides*, *Muscides*, and *Anthomyides*; the last of which, according to the primary division we have proposed above, would fall under the second group, with which it is connected by more numerous relations of affinity than with the first; although its close affinity to the *Muscides* also is undeniable. *Phasia* and the allied genera are associated with the *Tachinides*: this seems unadvisable, considering the different structure of the abdomen, and the very peculiar distinctions of the sexes. The *Stomoxydes* are included with the *Muscides*; a combination to be approved, in regard to the indigenous fauna at least. All previous attempts to separate the sub-families, *Tachinides*, *Dexides*, *Sarcophagides*, and *Muscides*, by tenable characters, have proved futile; nor has Mr. Walker succeeded better than his predecessors have done, or his successors are likely to do for a long time to come. The weakest point in this arrangement seems to us to be his distinction of the *Sarcophagides* from the *Dexides* and *Tachinides* by the thorax, long in the first, short in the two latter groups; since this part appears to be quite as much elongated in many, both of the *Tachinides* and *Dexides*, as in any *Sarcophaga*.

The *Acalypteræ* are divided by Mr. Walker into the sub-families *Helomyzides*, *Borborides*, *Lauxanides*, *Ortalides*, *Sepsides*, *Loxocerides*, *Psilides*, *Oscinides*, *Geomyzides*, *Phytomyzides*, and *Hydromyzides*. We find nothing to censure in this division generally: in particular, the separation of the *Helomyzides*, *Lauxanides*, *Ortalides*, and *Sepsides* from the remaining sub-families, in which the subcostal and mediastinal veins are united, and not separated as in these, has an appearance of reason; but, unfortunately, the union of these veins is not always so complete as the author seems to assume. The least satisfactory of these groups is the sub-family *Helomyzides*, the contents of which are rather heterogeneous. Of the genera admitted into it, *Scatophaga* and *Cordylura* approach more to the *Anthomyides*; while *Dorycera* and *Tetanops* come nearer to the *Ortalides*, and might even be better placed among these. *Eurhina* belongs to the *Oscinides*; *Coelopa* stands nearer to the *Borborides* than to the rest of the *Helomyzides*, and would be better placed among the former, a change which would probably draw *Orygma* also after it. These extraneous elements being removed, there would remain still united under the *Helomyzides* but two groups, having for their types respectively *Helomyza* and *Tetanocera*, which might accordingly be denominated *Helomyzides* and *Tetanocerides*. We have nothing to object to the conjunction of *Saltella* with the *Sepsides*, notwithstanding the difference of veining of the wings, as the structure of the mouth tends to unite them. More questionable is the place assigned to *Calobata* in the same sub-family: of this Mr. Walker himself seems to have been conscious, since he places the genus *Micropeza* at the head of the next sub-family, *Loxocerides*; from which results at least a prima facie connection of this genus with *Calobata*, to which, in fact, notwithstanding many differences, it stands in a nearer relation than to any other genus we can name. The enumeration of genera under the particular sub-families is, however, too incomplete to give a clear insight into the principle of Mr. Walker's arrangement, and thus to afford the grounds for a deliberate judgment of it.

17. Oestridæ.—So briefly characterized that we have to rely chiefly on the figures to supply the deficiency.

After the *Brachycera* come the *Hypocera*, containing the single family Phoridæ. The character of this family should have included the peculiar form of the metathorax, which forcibly recalls to mind the similar structure in the *Dolichopidæ*. The large round joint of the antennæ is called the *third*; in this the author may, perhaps, be right, although we must confess that we have never been able to distinguish more than one very minute

joint preceding it. The figure of the antennæ of *Phora* also shows but one such.

The second volume ends with the *Eproboscidea*, divided, properly enough, into the two families, Hippoboscidæ and Nycteribidæ.

The third volume, besides the group *Suctoridea*, contains the *Nemocera*, divided into the following families :—

1. Mycetophilidæ.—This family includes two essentially distinct groups, the first ending with the genus *Sciara*, while the second consists of the genera *Zygoneura*, *Epidapus*, *Lestremia*, *Cecidogona*, *Anarete*, *Catocha*, and *Campylomyza*, distinguished from the preceding by the shorter coxæ, and the absence of spurs to the tibiæ, as well as by peculiarities of the venation and of the antennæ. It is palpable, indeed, that this second group holds an intermediate place between the first group of the *Mycetophilidæ* and the family *Cecidomyidæ ;* so that the question is, whether to associate them with the former, as Mr. Walker has done, or with the latter, as others have proposed ; or, finally, whether we should not regard them as a separate family—and so they have been treated already. That Mr. Walker, in his solicitude not to multiply the number of the families, should have preferred one of the first two alternatives is well enough ; but we should have been better satisfied if he had joined them to the *Cecidomyidæ*, rather than to the *Mycetophilidæ*, as he has done. He has, probably, been determined to this by a consideration of the oral organs ; but we may observe that these present no essential discrepancy from the type of structure which prevails among the *Cecidomyidæ*. By transferring those genera to this family we obtain more precise distinctive characters for it as well as for the *Mycetophilidæ ;* for the latter, tibiæ without exception armed with spurs, and elongated coxæ ;—for the former, spurless tibiæ and shorter coxæ, besides other characters. How nearly *Sciara* approaches the *Gall-gnats*, even in its economy, is shown by the fact that the galls on the young shoots from the stumps of lime trees, mentioned by Mr. Walker, p. 130, are produced, not by a *Cecidomyia*, as he has supposed, but by the *Sciara tiliæ*. To prevent misconception, it is right to add that in the genus *Zygoneura*, the tibia has a rudimental spur ; so that this genus is most properly placed at the boundary line between the *Mycetophilidæ* and *Cecidomyidæ*, these families being taken in the sense which we have proposed.

2. Cecidomyidæ.—It must be a mere oversight that the author has written the name *Cecidomyzidæ*, since, in every other instance, he has strictly adhered to the etymological form of the family name, as a derivative from

that of the typical genus. The genus *Ozirhynchus* Rond. is twice mentioned as belonging to this family: it should have been observed that the name *Clinorrhyncha* is in use as a substitute for that spurious compound.

3. Bibionidæ, and 4, Simulidæ.—We find nothing to criticise in the composition of these families.

5. Chironomidæ, and 6, Culicidæ.—Departing from the ordinary usage, the genera *Corethra* and *Mochlonyx* are here removed from the former to the latter of these families—an innovation which to us appears an undoubted improvement of the system. A more distinct explanation of the grounds of this change might have been given, touching the structure of the proboscis especially, as this has hitherto been taken as the determining motive for the place assigned to those genera.

7. Phlebotomidæ.—It would have been a happier choice to have taken the family name from the older generic name, *Psychoda*, a genus richer, too, in species; as the word itself suggests the peculiar aspect which all the members of the family derive from the dense pubescence; while the propensity to blood-sucking is confined to certain genera, which seem to form the like contrast to the rest of this family, which, among the *Culicidæ*, *Culex*, *Anopheles*, and *Aedes*, on the one hand, do to *Corethra* and *Mochlonyx* on the other.

8. Heteroclitæ.—This family is given subject to the express qualification that the author intends by it no natural group, but a merely artificial combination of two genera, *Orphnephila* and *Dixa*, for which he could find no place among the other families. The genus *Orphnephila*, in truth, is one of such a singular structure that it is not easy to arrive at any satisfactory conclusion as to its place. But as a purely artificial division of this sort is liable to objections, it might have been better to have referred *Orphnephila*, as an abnormal member, to some of the other families; and the relation of this genus to *Macropeza* would, perhaps, supply the best clue to the choice among them. *Dixa* might have been reduced to the family *Tipulidæ* without any great difficulty.

9. Tipulidæ, and 10, Rhyphidæ.—There is nothing in the composition of these two families but what we may assent to; in particular to the genus *Rhyphus* being treated as the type of a distinct family, which we consider as standing in a closer relation to the *Brachycera* than does any other family among the *Nemocera*.

In concluding this general review of the arrangement which Mr. Walker has adopted, having stated various points in which we differ from him, we would again repeat that it is one of the best—we might say the best sys-

tematic arrangement of the Diptera that has yet been proposed; meaning, of course, within the limits in which only this can be predicated of a system based upon a local fauna. If there be other systems, as, for instance, that of Mr. Macquart, in his Dipteres Exotiques, liable to fewer criticisms, the reason is, that the families are taken there in a much more restricted scope, which has made it greatly easier to circumscribe and characterize them.

We proceed next to take a glance at the genera given by Mr. Walker, their composition and contents. There is a great want of uniformity here, in the extent assigned to particular genera. While a judicious medium has been observed in the majority of families, the sub-division in some cases, as, for instance, in the sub-family, *Hydromyzides*, is carried on to a degree of minuteness almost frivolous; while, in other instances, it stops far short of the measure, and presents (as in the *Muscidæ*) genera of such unwieldy bulk as greatly to impair the usefulness of the work. It is fair to say that a complete analysis of the system of Diptera, up to its ultimate members, is not an undertaking to be disposed of incidentally in the treatment of a particular Fauna. Accordingly, such a work will naturally be more complete in those portions which have formed the subject of able Monographs, or which have obtained the special attention of the author himself, than in others, where neither of these has been the case. It is no blame to Mr. Walker that it is so with the present work; but it seems to us that he has, in some instances, stopped short of what his predecessors had already accomplished, and which he need only have adopted from them. If not disposed to follow the precedent set by the French Dipterists (Macquart in particular), in the much needed sub-division of the genera *Tachina*, *Musca*, *Dexia*, and *Anthomyia*—and from this he may have been deterred by not unreasonable scruples against the excessive multiplication and often indefinite character of the new genera—yet, surely he might have adopted the chief part of those which Meigen has admitted in his seventh volume. His work would have gained much by this, both as to uniformity and practical utility. The study of such genera also as *Limnobia*, *Ceratopogon*, *Chironomus*, and *Cecidomyia*, would have been facilitated by their distribution under smaller genera. The characters of many of the genera are very well drawn; in other cases as much cannot be said of them; and there are two opposite faults which invite remark by their frequent recurrence. One of these is the introduction of mere specific differences into the generic character; the other, that this is made to embrace propositions applicable

to all the genera of the same family, and, therefore, of right belonging to the family character. As the space does not permit us to go into a detailed examination of all the genera, we must confine ourselves to a notice of the most obvious corrections necessary in a portion of them, along with some criticisms on the analytic tables of the genera.

In regard to the latter of these, the first remark which occurs is on the distinction of the genera Oxycera and Clitellaria, by the antennæ, eight-jointed in the former, and nine-jointed in the latter genus; when the more obvious character of the lateral spines of the thorax in *Clitellaria* would have afforded a better criterion.

Beris and Actina.—In both these genera, the abdomen is evidently composed of seven segments. The want of spurs to the tibiæ is a character belonging to the whole of the family *Stratiomydæ*. "Head depressed," does not express the true form of that part; and, to prevent mistakes, it would have been well to have mentioned that the number of the spines of the scutellum is very liable to vary. The description of the wing-veins of *Actina* requires correction: how is it that the third, fourth, fifth, and sixth posterior areolets are said to be open to the border; for where can we find six posterior areolets in this genus? Again, that the *fourth* and *sixth* are more or less united is wrong; since the areolets intended are in immediate juxtaposition.

Stratiomys.—Contrary to prevailing usage, the author has united here the species which are generally divided between the genera *Stratiomys* (*Hoplomyia* Zett.) and *Odontomyia*. The species of these two genera are, indeed, not very distant from each other; yet it would have been better to have kept them separate, as there is a marked difference in their general aspect, and there is none, of the British species at least, whose position could be doubtful between them; but chiefly because a more precise definition of the genera might thus have been arrived at. The phrase "antennæ stylatæ" is not correctly applicable to the species of *Stratiomys* in the restricted sense: of the six joints composing the flagellum, the first three or four are longer, the following ones much shorter, the last two often not perfectly distinct from one another. In the species of *Odontomyia* the terminal joints generally form an acute oblique style, although in some this is very obtuse, and in that case much less defined. It is, perhaps, not a fault in the character that the abdomen is described as of five segments; though there are actually seven; the sixth and seventh are very minute, and usually retracted within the fifth, which is the case also with the allied genera.

Oxycera.—The abdomen is not properly "depressum," as it is convex above: the eyes are not quite naked, even in the females; and certainly not in the males of all the species red above and green in front, as stated here.

Clitellaria.—It would have been better to have called this genus *Ephippium*. Unless a new generic name is introduced, *Clitellaria* belongs by right to the species with spines to the scutellum, but none to the thorax; and *Cyclogaster* to those in which both these are unarmed. We cannot approve of the omission of a character so striking as the lateral spines of the thorax; the stoutness and erect position of the spines of the scutellum should also have been noticed; and this is not properly semicircular, but trapezoidal.

Nemotelus.—The abdomen is not incurved at the tip in any species of the genus; at least not in life. The description "eyes naked" may pass, as regards the British species; though even in some of them the extremely short and scanty pubescence is visible with a moderate magnifier. That the eyes of the male are red above and green in front is a very imperfect description, and calculated to mislead.

Pachygaster.—The antennæ are characterized as 7-jointed, while the eighth joint is mentioned directly after, an oversight which does not affect the English text; it is not noticed that this joint is very minute. The characteristic shape of the comparatively large discoidal areolet should not have been passed over in silence. The subdivision of the *Stratiomydæ* distinguished by that abnormal disposition of the wing-veins (comprehending the genera *Platyna*, *Biastes*, *Ptilocera*, and *Chauna*,) has the genus *Pachygaster* for its sole representative in the European Fauna.

Chrysomyia.—The antennæ are not six, but eight-jointed; the very minute seventh joint and the eighth composing the arista, which is not completely apical, but rather dorsal, being inserted close to the junction of the fifth and sixth joints, as it is easy to see in the larger species. "Abdomen ovale" is not a good description, it is rather spatulate; and the eyes are not naked, even in the smaller species, but the pubescence only thinner and shorter in them.

Sargus.—Here also the antennæ are seven-jointed, as in *Chrysomyia*, and they differ little in structure in the two. Mr. Walker is mistaken in calling them six-jointed, and the account of their structure in general is imperfect; the figure is correct, only the position of the arista is not given quite exactly. The abdomen is described as consisting of seven segments in *Sargus*, while only five were assigned to it in *Chrysomyia*, immediately

before. The composition of it is, in fact, essentially the same in both, the last of the seven segments, of which it consists, being imperfectly developed and mostly concealed: the only difference is that the seventh segment is usually rather more apparent in the species of *Sargus* than in the smaller *Chrysomyiæ* or *Microchrysæ*.

Xylophagus and Subula might have been most readily distinguished by the fourth posterior areolet being open in the former and closed in the latter genus. One of the generic characters given for *Xylophagus* is "tibiæ apice spinosæ" (calcaratæ is the more usual term): this is a character of the family at large. The terminal segments of the abdomen in *Subula* are represented as forming a tubular jointed oviduct (ovipositor is meant); a very inappropriate description.

Tabanus.—The absence of terminal spurs to the hind tibiæ should not have been overlooked, as this is the only reliable distinction to separate the genus from *Pangonia*. What the author means when he terms the antennæ "subretusæ" in this genus, as also in the two following, is unintelligible.

Hæmatopota.—An essential character of the genus is omitted, the presence of a conspicuous recurrent process near the base of the anterior branch of the cubital vein; as also the peculiar marking of the wing, in all the known species.

Chrysops.—The presence of the minute terminal spurs of the hind tibiæ has been overlooked; the phrase "antennæ inserted in the middle of the front" is as vague and unsatisfactory as when it is said of *Hæmatopota*, "antennæ inserted in the front of the face."

In the family *Acroceridæ*, the presence or absence, and the number of the ocelli, are among the most important of the generic characters.

Acrocera.—"Alulæ large, &c.," should be struck out, as belonging to the character of the family; and "ocelli three" should be added, as also that the eyes meet below the antennæ, and that there is a short proboscis. In this genus the antennæ are two-jointed.

Henops.—This name, proposed by Illiger, should yield to Latreille's *Oncodes*, as Erichson has shown in his Monograph of the family. The antennæ are two-jointed in this genus also; but there is no proboscis, and the mouth appears to be completely closed. Mr. Walker's account of the oral organs seems to be merely a repetition of the old errors, which Erichson has rectified. This genus has only two instead of three ocelli; and here also the size of the alulæ should be excluded from the generic character.

In the synoptic table of the genera of *Asilidæ*, Dioctria might have been

distinguished from Dasypogon by the different structure of the antennæ, better than by the very illusory character taken from the direction of the proboscis.

Laphria.—The green colour of the eyes is one of the most striking distinctions of this genus. We have already noticed the correct number of abdominal segments in this and the following genera.

Asilus.—The description of the ovipositor in the females is inaccurate, as well as the statement that the middle stripe of the thorax is shortened in front.

Dasypogon, by an oversight, is characterized as having "areola *discoidalis* aperta:" it should have been *mediastina*, agreeable to the English text.

Dioctria.—The sides of the abdomen are said to be sometimes marked with yellow; this is not strictly true; in the females only, the yellowish connecting membrane between the dorsal and ventral half-rings sometimes becomes visible, in consequence of the enlargement of the ovaries. The character "front broad in both sexes" should be left out, as belonging to the family at large.

Leptogaster.—The phrase "antennæ articulo tertio longo" gives a very erroneous notion of the structure; that joint in the present genus being shorter than in any of the other indigenous genera. The style is said to be hairy, while, in fact, it has only a very inconspicuous pubescence in *L. cylindricus*, the only British species; and this would have been better unnoticed, as it is by no means universal in the genus.

Leptis.—The characters derived from the form of the epistoma are mostly common to all the genera. So also the presence of three ocelli, and of spurs to the tibiæ, and the structure of the thorax described, all belong to the family character. In the English text the third joint of the antennæ is erroneously termed transverse, a character which applies only to *Atherix* and *Ptiolina*. The unmeaning phrase "antennæ seated in the middle of the front" occurs again here, and in the descriptions of the following genera.

Chrysopilus.—The epistoma is erroneously described as convex: in this, as in the preceding genus, it is impressed with two deep and broad furrows, and it is only the small intermediate space between these that is convex; the structure being thus absolutely the same as in *Leptis*, while the description would suggest a marked difference between the two.

Atherix.—The epistoma is termed "not prominent," a phrase which conveys nothing positive.

Ptiolina.—The fourth joint of the antennæ, described as "short," is really long and setaceous.

Spania.—Here, again, the account of the structure of the antennæ is very vague; and this is the more unsatisfactory, since the figures given to illustrate it are also inaccurate.

In the synoptic table of the genera of *Bombylidæ*, Thereua is divided from the other genera by the character "wings short." This phrase, so liable to misconstruction, would have been better replaced by the character derived from the greater number of posterior areolets in the wing of *Thereua*. Equally unsatisfactory is the distinction of Lomatia and Anthrax by the greater distance between the antennæ in the former genus. This difference may hold good of the British species, but it tends to give a totally false impression of the relation between the genera; the only trustworthy criterion, and which should have been employed accordingly, is the elongated first cubital areolet of *Lomatia*.

Thereua.—The proboscis is characterized as "occulta:" the utmost that can be properly said of it is "retracta," and not that even in all the species. The vast difference in the form of the epistoma and in the venation, which separates the genus from the rest of the family with which it is here associated, is passed over in silence. This should have been expressly noticed, while "oculi nudi" and "ocelli tres," affording no distinctive character, might have been dispensed with.

Anthrax.—The genus is taken in the extent given it by Meigen in his third volume, and in the supplementary work of Wiedemann. It would have been more judicious to have followed the generally received division into two genera, *Anthrax* and *Exoprosopa*. It is no objection to this that the small number of species found in Great Britain does not require such a subdivision. The writer of a Fauna should regard his subject from the common point of view of the General System, and not modify this according to the particular circumstances of his limited material. The account of the predominant colours in this genus is calculated to perplex rather than inform.

Lomatia.—The character from the wing which we have specified ought to be added.

Bombylius.—By an oversight, in the Latin text, the eyes of the female are qualified as "contigui," instead of disjuncti.

Phthiria.—The first posterior areolet is always open in this genus; a character the more worthy of notice, as it serves readily to distinguish the genus from *Bombylius*, of which none of the British species have that

areolet open. The number of the veins (three) proceeding from the discoidal areolet to the hind margin also would have deserved a mention, as this distinguishes *Phthiria* from *Geron*, *Oligodranes*, &c.

Scenopinus.—The epistoma is termed "minime prominens," which does not express its excavated form. The third joint of the antennæ is described as "subcylindricus truncatus" in the Latin text, and afterwards even as "pointed:" none of these terms seems to us to apply; least of all, "obliquely truncated at the tip:" we have never seen it otherwise than obtuse. The discoidal areolet is termed "subretracta basalis:" we can discover nothing of the sort. It is not correct to call the abdomen marginated, if by this is meant the presence of a defined border; but if sharp-edged is meant, this is not true of the male, nor yet of the living female; but in this sex the posterior segments do usually acquire a sharp edge from contraction when dried.

In the family *Empidæ* the differences in the venation of the wings have not obtained the place they deserve to hold among the generic characters.

Empis.—The eyes are described as contiguous in the male, which is not by any means the case in all the species.

Hilara.—In the Latin text the forked vein is denominated vena *costalis*, instead of *cubitalis*. The characteristic direction of the anterior branch in this genus should not have been unnoticed.

Ragas.—The separation of this genus from *Hilara* seems proper, although the species of the two resemble each other very much. The spine on the underside of the middle femora in *R. unica* is simply a specific character, as it is not found in the same sex of *Hilara minuta* Zett., which must be referred to the same genus.

Brachystoma.—The generic characters are taken from *B. longicornis*; while *B. vesiculosa*, the most conspicuous species and the longest known, and of which the very short proboscis suggests the generic name, should be regarded as the type. The former species differs from this so much, that a new genus might well have been formed to receive it.

Heleodromia.—The author has not followed Zetterstedt, who has united this genus with Brachystoma: in this we agree with him. But the separation from *Wiedemannia* Zett. is scarcely defensible, as no precise line can be drawn between the two, the length of the epistoma increasing by degrees, and concurrently therewith the protrusion and solidity of the membrane which connects the proboscis with the peristoma. We can discover no other difference of any moment; so that we subscribe to the opinion expressed in the Addenda, that the two had best be conjoined in one

genus, to which the name *Clinocera* Mg. should be applied in right of priority. The phraseology of Meigèn's description evidently shows that at the time he published it he did not possess the original specimens, but only an old sketch, defective in many points, the course of the veins toward the base of the wing, for instance, and taken, besides, from a specimen with irregular venation. This will account for many obscurities in that description, and for the erroneous place in the system which he was induced to give to it, the consequence of which has been that the genus has not been generally recognised since. Individuals with irregular veins are not uncommon among the species of *Clinocera*, as well as of the neighbouring genera. In particular, the anterior branch of the cubital vein is sometimes connected with the radial by a supernumerary transverse vein, or it is often interrupted at the base, and not seldom obliterated entirely.

Euthyneura.—The characteristic form of the discoidal areolet might have been added with advantage; and the identity of this genus with *Anthalia* Zett. should have been stated.

The genera of *Dolichopidæ* are divided and distinguished with much judgment. We could have wished to have seen the genus Dolichopus definitively resolved into two. In like manner, the author would have done service by a due subdivision of the genus Rhaphium. The distinction between the genera Argyra and Porphyrops is the least satisfactory of any in this family.

The generic characters among the *Syrphidæ* are not so happily drawn. Sufficient use has not been made of the differences of venation in the several genera; and in some cases important characters are neglected, as the naked wings of Eristalis, contrasted with Helophilus and Mallota, in which they are pubescent; the peculiar disposition of the veins, which separates Volucella so decidedly from all the other genera, &c. In other cases mere specific differences are treated as generic characters; in Milesia, for instance, the separate termination of the subcostal (in the Latin text "costalis") and radial veins. The separation of some genera is based on untenable characters; as that of Orthoneura and Chrysogaster, on the form of the third joint of the antennæ; while the only real distinction between them—the difference of venation—is not alluded to. The position of the species does not always correspond to the definition of the genera; thus *Helophilus floreus* is placed in the genus *Eristalis*. We cannot approve either of the reunion of several genera usually considered as distinct; *Brachypalpus* and *Criorrhina* for example.

Space will not permit us to review with the same minuteness the ge-

nera contained in the second and third volumes; of which the execution, generally speaking, is inferior to the first. In this, we find particulars to be corrected and supplied; in the others, a complete remodelling would be often requisite. In not a few instances, we should be at a loss to determine the genera from the characters without the help of the figures; it is the more to be regretted that the style of the plates in the last two volumes is strikingly inferior to those given in the first. There are portions which we may except from this criticism, as the sub-families *Borborides* and *Hydromyzides;* the last volume, also, is much superior, on the whole, to the second.

The next thing essential in the composition of a work of Natural History is accuracy in the determination of the species, and the application of the trivial names. Considering the nature of the subject Mr. Walker had to treat, a mistake here and there does not seriously detract from the merit of the work. We doubt if any one can have gone beyond a very superficial study of the Diptera without discovering how difficult it is to determine the species with certainty, not only from the brevity of the descriptions given by nearly all the older authors, but also because of the hasty and undigested publications of writers who, instead of making the interests of science their end, have treated Natural History as the means of gratifying a puerile vanity. We, at least, are thoroughly persuaded of this, and are, therefore, not disposed to quarrel with Mr. Walker's book, because we cannot always agree with him as to the identity of species, such as, for example, *Leptis scolopacea*, *L. strigosa*, *Bombylius ctenopterus*, *Chrysotoxum intermedium*, *Eumerus selene*, *Asilus cristatus*, *A. fimbriatus*, *Empis unicolor*, &c. But, in some other instances, it appears as if Mr. Walker could scarcely have gone astray, as he has done, if he had studied the works of previous writers with a little more attention. It has probably been owing to the limited materials at his disposal that he has united together species indubitably distinct, as is the case under *Hæmatopota pluvialis*, *Bombylius major*, *B. medius*, *Syrphus pyrastri*, *S. scalaris*, *Tetanocera cucularia*, *Myopa ferruginea*, *M. atra*, *Trypeta heraclei*, *T. artemisiæ*, *T. serratulæ*, *T. arctii*, *T. solstitialis*, and many more that we could name. In other places, mere varieties are treated as species; at least, the characters he gives are insufficient to convince us of the value of such species as *Sargus nubeculosus*, *Chrysomyia flavicornis*, *C. cyaneiventris*, *Stratiomys subvittata*, *Criorrhina ranunculi*, *Microdon apiformis*, *&c.* Such occasional mistakes, however, are of much less consequence than the confusion which affects some genera and families throughout, in this respect,

forming a rude contrast to the accuracy observed in others. As we are obliged to trust for the identification of Mr. Walker's species solely to his descriptions, we hope that this criticism will not appear unfair to the respected author. Where the species are determined with precision, his descriptions are of a very different sort from those given where the discrimination of the species is ambiguous and obscure; in which case they degenerate into such insignificant phrases, even where the species of the genus are easy to distinguish—take, for instance, the genus *Chrysotoxum*—or confound the characters of sex and species (as in *Paragus)* to such a degree, that we are led to question the author's acquaintance with the genuine species. These doubts affect a considerable portion of the family *Syrphidæ ;* in particular, of the genera *Chrysotoxum*, *Paragus*, *Pipiza*, *Chrysogaster*, but, above all, *Cheilosia*, in which there are not above two or three species about which we feel quite satisfied. The species of *Musca*, *Tachina*, and *Anthomyia*, also, are liable to many critical doubts, as Mr. Walker's descriptions do not always suit the species which the names indicate.

The principles of nomenclature which Mr. Walker has followed in the case of species previously described under various names are so just that it would scarcely have been necessary to single them out for approbation, were it not that they are so often violated by other writers, and unfortunately often for reasons the most trivial. In particular, we are glad to see many unobjectionable names of old date restored, which had been generally overlooked or forgotten of late. In the great majority of these instances his example is likely to be followed, as the application of the ancient names is self-evident. In one or two instances sundry doubts might be raised, and there it would probably have been more judicious to have retained the current names, about which there can be no question. Another merit of the same sort is that he has identified so many of the species described by British authors with those known on the Continent. The study of the synonyms has gained not a little by this object having been kept so steadily in view, particularly in the Addenda to the last volume. It is only to be regretted that Mr. Walker has not referred more specifically to his own paper on the *Sepsides*, which has proved the source of many difficulties. His plan of a more particular reference to the earliest description, with the date, is to be recommended to imitation; the year, however, in several cases, requires to be corrected, particularly for the Linnean species, many of which ought to date back from the tenth edition of the Systema Naturæ. Mr. Walker, as Meigen had done before him, has also completely ignored the Systema Entomologiæ, in which so many of the species

of Fabricius were made known for the first time. An erroneous date is attached to the Entomologia Systematica of Fabricius throughout; but this, and some other trifling mistakes of the same nature, may be easily rectified. After referring to the earliest description, Mr. Walker mentions other authors who have the species under the same or a different name. The enumeration of synonyms is far from complete, but we cannot discover on what principle the selection has been made, mere catalogues of no practical utility being often referred to, while good descriptions and important Monographs, such as Erichson's of the *Acroceridæ*, are omitted. The genus under which the species is to be found in the writers quoted is not given, nor yet (with a few exceptions) the title of the particular work. It cannot have been Mr. Walker's intention to revise the entire Synonymy; the references are too few for this purpose, and, in many cases, too indiscriminate; and, besides, this lies out of the province of a Fauna. The only use, then, of such references is to identify the species intended with greater certainty, and to direct collectors where to look for a more particular description. For the first of these purposes, he should have specified the descriptions on which he has chiefly relied; for the latter, he might have thrown out a mass of references which are but learned lumber, and have selected the best description and the most characteristic figure, referring to them by the title, volume, and page; and, in this case, considerations of practical utility would have justified, *cæteris paribus*, the preference being given to works published in Britain, or to such others as may be most accessible to British collectors.

Another requisite in a work of this sort is a thorough mastery of the terminology, and a correct use of the scientific terms. Mr. Walker, and we cannot blame him for it, has adopted for the most part the phraseology current among the Entomologists of Great Britain, and the Dipterists in particular. While we have not thought it necessary to depart from this in reviewing his work, we do not wish it to be inferred that we approve of that nomenclature in general. In some parts it appears to need a radical reform; especially the ill-chosen names of the wing-veins and areolets, which are not likely to make way against general usage and the high authorities by which this is sanctioned. The terms applied to the parts of the head in the *Tachinides* have little to recommend them; the computation also of the joints of the antennæ, inclusive of the style or arista, is liable to objections; as Mr. Walker himself seems to have discovered by the time he reached the second volume, see *Tachina*. In adopting that plan he was obviously influenced by the plausible assumption that the last

joint of a six-jointed antenna, for example, is analogous to the sixth in the case where there is a greater number of joints; but this is not the fact, as the consolidation of several joints into one can be demonstrated in many instances. In the first volume generally, the terminology is more irregular, and it improves in consistency and precision towards the close of the work. The discrepancies as to the application of the terms in different families require to be corrected, for the sake of uniformity; they are not, however, very material on the whole, being mostly of such a nature as the undecided use of the term pulvillus, at one time as including the empodium, at other times as distinct from it. There are some expressions, such as clavatus and obclavatus, conicus and obconicus, habitually misapplied, the parts being described as viewed from behind; whereas the reference should be always to the base. Accordingly, the application of the terms is usually correct, where the base lies backwards, as of the antennæ; but the contrary, when the direction is the other way, as in the case of the abdomen. The frequent substitution of semicircularis for semiglobosus or hemisphæricus, stylatus for styliformis, oviductus for ovipositor, spurs for spines, and *vice versa*, is objectionable; as well as the habitual use of the word scapula for callus. The nomenclature of colours, too, is vague and inaccurate; but this is an error into which nearly all authors of late have fallen.

Regarded simply as a Fauna, Mr. Walker's work contains much more than is required of that. It is not so clear that it is the better of the additions; and, if they had been retrenched, there would have been room for matter more essential, which is sadly missed at present. If it be asked what we consider as the proper objects of a Fauna, we may answer:—1st, to give a complete list of the species positively ascertained as indigenous within its local limits. 2nd, to enable the collector to identify the insects he finds with the least possible trouble and loss of time. 3rd, to afford practical directions as to the situations in which they are to be looked for, and especially in their earlier states. Lastly, it should be got up in such a form and size as will admit of new editions at short intervals, so as to keep pace with the progress of the science, without drawing too heavily on the pockets of the purchasers. It is conceivable, indeed, that the author of a Fauna may feel himself obliged, or, to speak more plainly, may be seduced, to go beyond what has been specified as indispensable, when he finds the scientific foundations defective on which he has to raise his superstructure. The weak points may lie either in the imperfect state of knowledge of structure, and the consequent imperfection of the terminology, or in the defects of the classification, or in an inadequate knowledge

of the species. In relation to any of these, he may expand his work, by beginning afresh from the foundation. But, in every case, he commits a fault by so doing. If such a preliminary labour is necessary, the interests of science in general, and, ultimately, the purposes of the Fauna, would be better served by making that the subject of a distinct work; which should take quite a different form, and aim at other ends than this is restricted to. But, apart from what the writer may be tempted to do of this kind, he may, without impropriety, extend his work, in other ways, beyond the strictly necessary objects aforesaid. Such legitimate additions would be—to give a comparison of the particular Fauna with that of the neighbouring countries; the geographical range of the species, as far as this is known; the first discoverers of species within the local limits, and the earliest or most successful observers of the transformation, natural economy, and the like. Everything, besides, that the author can do to direct the mere collector, for whose especial use he writes, to the sources of more complete information, and to smooth the way for him to a more comprehensive and profounder study of the science, may be thankfully accepted, provided he takes care always to keep in view the more direct design of a Fauna, and does not make it too voluminous. If so much be not obligatory upon him, at least he incurs unqualified blame if the form or matter of his work be such, as not only to leave the student at fault, but even to put impediments in his way.

Of all the essays in the nature of a Fauna of this order, we consider the lists of Austrian Diptera, by Dr. Schiner, in the Transactions of the Zoological and Botanical Association of Vienna, to be the most judicious, characterized as they are by accuracy in the determination of the species. A more distinct indication of the best descriptions and figures, the omission of many redundant synomyms, a more methodical way of exhibiting the local range, and, as far as space may admit, the addition of the chief specific characters, and of the essential differences from the nearest allied species, is all that seems wanting in them to satisfy every necessary requisite of a Fauna, without enlarging it to excess by the introduction of extraneous matter. When Mr. Walker's work is tried by the same rule, it appears to fall very short of what a Fauna of Britain ought to contain. The species already known as British are not fully enumerated (in the second volume especially); neither are the species given all unquestionably indigenous; on the contrary, many are introduced on mere conjecture and probability—as a considerable proportion of the species of *Ceratopogon* and *Cecidomyia* in the third volume. In the second volume many are men-

tioned merely by name as British, the specific identity of which is in no wise authenticated, but in many cases is, in all probability, mistaken. The object of enabling the collector to name his insects in the readiest and shortest way is not at all satisfactorily attained. The analytic tables, intended as a guide to the determination of the species, come very near the mark, indeed, in some cases; as in the family *Dolichopidæ*, where the analysis only wants to be carried out further, when it leads to several species collectively. In other cases, they have a semblance of precision, which tends rather to mislead, as in the genera *Tachina* and *Anthomyia*. The diagnoses and descriptions are not of uniform quality in all the families; sometimes the description is little more than a translation or paraphrase of the diagnosis, when the repetition should have been avoided, if but for the sake of saving room; nor, in fact, does there appear any good reason for keeping the two distinct. It would have been better if Mr. Walker had consolidated them, confining himself to the distinctive characters, especially those of form, and signalizing the differences from the nearest allied species more particularly than he has done. Scarcely any directions are given where to find the insects, or how to procure them by rearing; and this in a work professedly intended for the use of collectors. Scientific entomologists have neither right nor motive to look down on those who occupy themselves chiefly with collecting; but, on the contrary, the strongest reasons to afford them all possible encouragement and aid. The recruits of science must be drawn from the ranks of the collectors; and many mere collectors have rendered as much good service to it, as scientific smatterers have done harm by their scribbling.

Along with the matter of merely temporary value, Mr. Walker's volumes embrace much that is of permanent interest: this we must consider as an actual defect. What properly belongs to the Fauna will in time become obsolete, by the continual new discoveries of indigenous species, and this lies in the nature of things; while the portion that is of durable interest, as the descriptions of new species, will make the work, with all its lumber, indispensable to future writers; and every new edition of it, if got up in the same way, will be equally so. This may be for the advantage of booksellers, but it must prove a serious clog to the march of science. We have already made the remark that the author of a Fauna may be tempted to originate for himself the scientific foundation which his work requires. We may observe that Mr. Walker has taken this course in two ways particularly. In respect to the systematic portion, we have before acknowledged the merit of what he has achieved; this is so great that we con-

sider his work to be of more value as a contribution to the classification of the indigenous Diptera than as a Fauna. Secondly, the confessedly imperfect knowledge we possess of species has given Mr. Walker occasion to expatiate in the descriptions of a vast number of new, or supposed new, species. He is not the only author that has written a Fauna on the plan of a Phanerogamous Flora, without reflecting on the inherent difference in their respective objects. The multitude of species in the class of insects is accumulating at such a rate, by constant fresh discoveries, that it has become a question which seriously affects the prospects of the progress or decline of entomology, in what manner, and through what channels, the characters of the new species should be made public. And, as we have ventured to find fault with Mr. Walker for introducing so many new species into his work, we feel bound to justify the view we have taken, by entering a little more at large into this discussion.

It needs no very profound study of the direction which Entomology has been taking, and especially as regards the order Diptera, to convince one that the old routine—unhappily not yet quite out of date—can end in nothing better than general confusion and error. Antecedent to Fallen, Meigen, and Wiedemann, a very few words were thought sufficient to characterize new species intelligibly for all time to come; while every one now who has attempted to identify the species of the older authors knows, by experience, what loss of time and labour this requires in most cases. Fallen, Meigen, and Wiedemann distinctly saw the error of their predecessors, and amplified, accordingly, their own descriptions, in such a measure as their experience suggested. We, who are reaping the full benefit of their labours, find in turn how often the descriptions even of these admired authors prove insufficient for our satisfaction, from their omitting points which would have been decisive. Hence we are brought to the deliberate conviction, that in order to authenticate new species, the descriptions of them should go into the most minute details; if the study of the Diptera is not to be—as threatens to become the case—engulfed in the quicksands of endless critical discussion about unsatisfactory descriptions, instead of the direct observation of nature, and the continually progressive acquisition of fresh knowledge. It might have been imagined that the apprehension of such consequences would have served as an effectual check upon the publication of slight original descriptions: unhappily, experience too plainly proves the contrary. The chief reason for this, doubtless, is, that the construction of accurately minute and detailed descriptions is an exercise of the most laborious nature. And, as the time and pains required for this

purpose, and the space which such descriptions would take up in print, tend to set bounds to the ambition of being the author of a host of new species, all sorts of excuses are found—as the nature of the publication, or want of room, &c.—to evade the performance of what is admitted to be obligatory in theory. The style of some published notices almost suggests the suspicion that there was a secret intention to escape critical scrutiny, by not being too particular in the description of species assumed to be new, and forthwith ushered into the world as such, without the trouble of deliberate examination. There is, indeed, a class of Entomologists—the number of them, however, is daily diminishing—who do not conceal their fears that the publication of such ample descriptions will lead to an excessive enlargement of the literature of Entomology. With some, this apprehension seems to arise out of the mistaken supposition that all the species are to be described with the same prolixity in every distinct work; which was never intended. It is only about the publication of new species that we are contending. Others, again, who start the like objection, might find a ready answer to it of themselves, if they would only consider in what way they would serve the interests of science most effectually, and not how best to glorify themselves in the paternity of new species. They would then see, in its true force, the obligation to characterize the species to the very best of their ability, for the satisfaction of other inquirers. The points in which a species differs from the others known, important as they are, are not alone sufficient for the purpose; but the most complete description is desirable, in consideration of the number of species probably yet undiscovered. Every such description precludes, by anticipation, a mass of critical questions and debates likely to arise for want of it, and enables us to dispense with the useless, but, unfortunately, prevalent fashion of describing the same species over and over again; as a distinct reference to the original description, in this case, would serve to determine the species with more certainty than any separate abridged description. The most detailed description of all the European insects of this order known up to the present time, if printed in a medium type, would not fill double the space taken up by Zetterstedt's Diptera of Scandinavia. And what a ground-work such a publication would afford for the future progressive investigation of the Diptera of Europe! With such a standard of reference, how concise the author of a Fauna might be in many cases, in which, at present, the unsatisfactory character of certain species obliges him, as he thinks, to be diffuse; and still he cannot afford to be particular enough not to leave room for fresh doubts and misapprehension. It

is not the length and minuteness of the original descriptions of new species that is likely to crush the literature of Entomology under its own weight; but, on the contrary, the brevity and the omissions which give occasion to fresh descriptions of the species, no more satisfactory than the first, to consequent critical doubts, clashing opinions, and prolix discussions arising out of them. And the uncertainty in which the beginner is left, in attempting to determine the species he possesses, discourages him, and often leads to his giving up collecting altogether. There is no other order of insects which labours under these disadvantages to the same degree as the Diptera. The reason lies in the multiplicity of the species, the minuteness of the distinctive characters in many of the families, the want of sharpness in the outlines, owing to their soft consistency, and the general absence of sculpture. Their liability, also, to injury in the act of capture, and the difficulty attending their preservation in the cabinet subsequently, are not without a concurrent influence. For all these reasons, the greatest circumspection is advisable in promulgating new species of Diptera. We would not have it supposed for a moment that we think of implicating Mr. Walker in the levity of authors like R. Desvoidy, for instance, whose extravagant book, Les Myodaires, stands as a stumbling-block in the way of the science, to get rid of which may task for many a long year the efforts of the ablest entomologists, which might have been employed to much better purpose. But Mr. Walker is too experienced an entomologist to feel persuaded himself that such descriptions as he has given of many species of *Tachina* and *Anthomyia* are calculated to meet the exigencies of science. And those descriptions of new species, or what are taken for such, have robbed him of the space requisite to give a complete list and the distinctive characters of the previously-described species which are unquestionably indigenous, and have obliged him to dispose of the confessedly difficult discrimination of the species of these genera in a very superficial manner. But it is not only that his work has lost more, as a Fauna, than science in general has gained, by his introducing those descriptions; but we must object, on principle, to the publication of new species as part of the Fauna of any European country. Since every work of this nature must soon become obsolete, by reason of the more perfect investigation of the district, everything should be excluded that bears a different and a durable character. Nor can any Fauna afford the room necessary to characterize the new species with sufficient minuteness. It is in vain to appeal to such an instance as Zetterstedt's work on the Diptera of Sweden. That is the fruit of a long lifetime exclusively devoted to the

study, possessing a vantage ground of the most favourable kind in the antecedent writings and the collection of Fallen, and aided by the disinterested co-operation of all the Dipterists of the peninsula. Where can we hope for such a concurrence of propitious circumstances again! And, voluminous as that work has been rendered, may it not be a question whether the descriptions are satisfactory, after all? Would it not have been more for the interest of science, if Zetterstedt had published a separate corpus descriptionum, which would have been of permanent utility to all students; following this up with a proper Fauna of more manageable size.

Of the legitimate additions that we have indicated, which would have added to the value of Mr. Walker's book as a Fauna, we do not find much in it; nor have we any right to complain of this. Not near enough has been done to direct collectors to more ample information, or to induce a profounder study of the science. More discrimination in the choice of authorities, and more particularity in the references to them, would have sufficed for that purpose, without any enlargement of the bulk. The too exclusive attention paid to the British species, in the characters of the families and genera, is ill adapted to communicate a general idea of the classification.

After all the criticisms of them that we have been obliged to go into, we must repeat, before taking leave of these volumes, our cheerful attestation of their high scientific merit, in more than one respect. If the work has not fully satisfied us, considered as a Fauna; we can pronounce a much more favourable judgment on it as a sketch of the classification of the Diptera, so far as this has its representatives in the British islands. For the sake of science generally, and of the British Fauna in particular, we hope that the future labourers in the same field will regard this work of Mr. Walker's in the light of a systematic essay, which requires but a slight supplement to make it complete; while, for the purposes of a Fauna, it would be rendered only more cumbrous and confused, by additions and corrections. One of the most useful labours a British Dipterist could undertake would be, to give more complete descriptions of Mr. Walker's new species—while the originals can still be consulted—through some channel where they would be easily accessible to students generally. When that is done—and we trust it may be before long—there will be the materials for a really good British Fauna of this order; and the more complete in itself this is made, independent of the book we have been reviewing, the better; as any other course would detract much from its utility. H. L.

MANUAL OF BRITISH BUTTERFLIES AND MOTHS. By H. T. Stainton. 8vo. London: John Van Voorst. Published in Monthly Parts, price 3d. each. Nos. 1 to 7, with woodcuts.

THE object of the above work, according to the author, is, "in the first place, to supply a want that has long been felt, viz., a work of small price, with serviceable descriptions of our moths and butterflies, and indications of their localities, times of appearance, food plants, &c.: to this are added tabular views of the families and genera, with the object of assisting the incipient in naming his specimens."

The utility and advantage, not to say the necessity, of a work having these objects in view, will readily be conceded on all hands; it only remains, therefore, to enquire, how far the author has succeeded, or failed, in carrying out these objects.

While there are many entomologists possessing a far more intimate and accurate acquaintance with the "Macrolepidoptera" than Mr. Stainton, few, if any, will be found to equal him in his unwearied zeal and ardent desire to disseminate among all ranks and classes a love and knowledge of his favourite pursuit; in proof of which, we need only refer to his "History of the Tineina," the "Entomologist's Annual," and the "Weekly Intelligencer," which latter we regard as one of the most useful and entertaining of his undertakings. In some respects, the work under review fully answers our expectations; while, in other points, it falls wofully short of them. The descriptions are, in general, accurately and simply given, and by means of them, the youngest collector, after once mastering the terms and abbreviations (which are *rather* difficult), can scarcely fail, at least among the "Rhopalocera," to discover the name of his insect. The list of localities is both interesting and useful, and may be confidently relied upon, the author, we believe, having corresponded with many of the best and most trustworthy entomologists, in reference to this portion of the work. The most valuable information, however, in our opinion, will be found in the description of the larvæ, and the various trees or plants on which they feed, and in this respect Mr. Stainton deserves great praise. It is most desirable to direct the attention of the beginner to "rearing," as, irrespective of the beauty and perfection of an insect thus obtained, the collector may remain for years without the insect at all (especially among the Bombyces) if he wait to capture it on the wing; and, even if thus taken, it will in most cases be so much injured as "not to be worth a pin." So far, we can with pleasure recommend the "Manual,"—not merely to the youthful, but to the more practiced entomologist.

There are a few plates, which, with some exceptions, had better have been left out. It would also have been a great addition to the value and usefulness of the work, had some preliminary observations (drawn up by a competent hand) been *prefixed* to it, relative to killing, setting, preserving, &c., &c. It is often said, "Catch your insect first, and then set it." We entirely dissent from this aphorism. We speak from experience when we add, that the very first question asked by the tyro is, "How do you kill and set an insect?" Look into the beginner's box or drawer of insects, and you see one wing up, and another down, the abdomen one way and the head another; while the unfortunate thorax is perforated by a stake, almost as large as the insect itself. We need not dilate upon mites, mould, and grease. It may be said, these observations are to be found in other works: we do not think they are; at least, not in the minute and copious manner we could wish. But, granting that they are, it does not affect the present question. In a book like the present, professing to be a Manual of Entomology, intended, especially, to supply the wants of the beginner, these preliminary observations appear to us indispensable, and that they should have been entirely omitted is much to be regretted.

But the great fault—one, we must candidly confess, which renders the work almost valueless in our eyes—is the system of nomenclature adopted by the author. It is calculated alike to propagate and to confirm error—to render "confusion worse confounded."

A few years since, Mr. H. Doubleday (admitted, on all hands, to be among the first, if not *the* first, of British entomologists) published a "Synonymic List of British Lepidoptera." It was drawn up with elaborate care, and immense toil; and his information was derived from the best and most reliable sources, at home and abroad. That it was not *perfect*, none will more readily admit than the author himself; but that it was by far the best thing of the kind, few, we should have thought, would have been disposed to deny; in proof of which, it may be added, that, unless we are greatly mistaken, it had no sooner appeared, than nearly all the best entomologists of the day re-arranged their collections in accordance with it.

This being the case, it would have appeared *strange* had Mr. Stainton materially deviated from it, at least without assigning strong and sufficient reasons for doing so; but that he should have actually ignored it seems *incredible*—yet, such is the fact. As far as the "Manual" is concerned, the "Synonymic List" might just as well have never been published at all—in truth, if *that* is to be "the Manual," it would have been much better if *this* never had been published.

From a multitude of examples which the author's—we were about to say *new*, but it should be *antiquated*—system so lavishly supplies, we can only select two, viz., the genus "Lithosia," and the genus "Notodonta." In the former, Mr. Doubleday includes twelve species, a most natural and obvious arrangement; Mr. Stainton only eight, while the remaining four comprise no less than four genera! We should be glad to learn—first, why these four are separated from the remaining eight? and, secondly, why they are separated from each other? All the larvæ are lichen feeders; all the insects (all, at least, we have met with) lie, when at rest, with the wings folded round the body, and in general form and appearance closely resemble each other. We repeat, therefore, that we should be glad to learn the differences which justify their separation into five distinct genera.

Again, in Mr. Doubleday's list we find "Notodonta" containing eleven species, while Mr. Stainton is so illiberal as only to allow it three! Seven of the remainder are divided into three more genera; while poor TREPIDA, exiled from house and home, comprises a genus in itself—we suppose on account of his size, or as some trifling reparation to his wounded feelings! Or let us suppose "Cucullina" (a friend of ours) to argue on this wise—"Why am *I* separated from the illustrious family of Notodonta? I have two humps on my back and one on my tail: why should I not go with my brethren "Dromedarius, Ziczac, and Tritophus? I am not the same *colour*, it is true; but still I think I am a pretty insect, and, moreover, I have the wedge on my upper wing like the rest. I demand, therefore, the restitution of my just rights."

It seems impossible to us to make a more natural genus than that of "Notodonta" as given by Mr. Doubleday in his admirable list, and we only regret that he did not *add* "Ptilodontis Palpina" to it. We think we have a right to ask Mr. Stainton his reasons for deviating from the new and adhering to the old system of nomenclature. We fear he must be a staunch Protectionist!

One more word with regard to an observation made by Mr. Stainton under the head of "Notodontidæ." At the conclusion of the prefatory remarks on this family occur these words—"Pupa smooth, *rarely enclosed in a cocoon.*" What *can* this mean? Unless he and we differ very much as to what a cocoon is, this is a strange error. Having had very considerable experience on this subject, we can confidently affirm (if we know what a cocoon is) that "Palpina," "Cucullina," "Dictæa," "Dodonæa," "Chaonia"—in a word, the pupæ of *all* the "Notodontidæ" are enclosed in cocoons.

We have written some of the above remarks with regret, entertaining, as we do, a very great respect for Mr. Stainton's praiseworthy zeal; but, honestly considering his system of nomenclature as calculated only to lead the beginner astray, we could not keep silence. We are not presumptuous enough to expect that this review will lead him to alter that system, however we might desire it; but we would earnestly ask him to consult some of the chief entomologists on the subject, and should they give similar advice, and should he then follow it, we shall have no hesitation in saying, that the "Manual" is not only the cheapest, but the most useful and valuable work we have on British Lepidoptera.

When the work has been completed we shall have the pleasure of again calling our readers' attention to it.

FERNS OF GREAT BRITAIN. Illustrated by John E. Sowerby: the Descriptions, &c., by Charles Johnson. 8vo. cloth boards. 48 Plates (plain), and Coloured Frontispiece. Price 6s.

FERN ALLIES.—A Supplement to the above. 8vo. Flexible Boards, containing 31 Plates. Full Coloured, 18s. Partly do., 9s.

BRITISH POISONOUS PLANTS. By Charles Johnson. Illustrated with 28 Plates, transferred to Stone, from Sowerby's English Botany. Crown 8vo. Flexible Boards. Full Coloured, 7s.: Plain, 5s. John E. Sowerby, 3, Mead Place, Lambeth. 1856.

ABOUT twelve months since we noticed in favourable terms the "Ferns of Great Britain," when we gave it as our opinion that, owing to the faithfulness of the illustration, and its other merits, the work would not be long absent from the libraries of all our English Botanists. Now, we think that as circumstances (disagreeable ones), into which we shall not enter, as we much prefer to let the dark clouds of oblivion lie over them, have induced the author to republish this volume at a price so very small it will be an universal favourite among every one who takes an interest in this study. We confess to have been amazed when we discovered the price of this volume. With forty-eight plates, and a coloured frontispiece of Blechnum boreale, all for the sum of six shillings; and we fancy that the very announcement of this fact should be inducement enough for every one to buy it, particularly when we say, once more, that the plates are (with an exception or two), faithful representatives of nature, and that the descriptive letter-press is quite sufficient for all useful purposes, and is by no means deficient in literary merit.

The next work on our list is a supplement to the previous one, and will prove most useful to every one engaged in investigating our native Equisetaceæ, Lycopodiaceæ, Marsileaceæ, and Characeæ. The figures illustrating the first three are very good; but as much cannot be said for those of the Characeæ. Yet we think it a valuable adjunct to the Native Ferns, and are not disposed to be over critical. The last work we have to notice will, we trust, command an extensive circulation. It most decidedly deserves to be recommended, and will be found a most useful manual. The following notice prefixed to this work will explain why it was published, better than we could, and we give it with pleasure :—

"The occurrence from year to year of cases of accidental poisoning, by the substitution of a deleterious for a wholesome vegetable, has led to the idea that a small work, illustrative of the poisonous plants indigenous to Great Britain, might be useful in rendering the subject one of more general interest than it has hitherto been; and that by directing attention to the dangerous results of such mistakes, originating in correspondence of form to well-known articles of food or condiment, it might render such casualties less frequent in future.

"The present work, first suggested by a letter in the *Times* deprecating the absence of this branch of education in schools, will contain illustrations of twenty-eight of the principal species, transferred to stone from the plates of the original edition of English Botany; and the descriptive portion being written by a gentleman, the greater part of whose life has, from his position as botanical lecturer at Guy's Hospital, necessarily been directed to this portion of natural history, will be a guarantee for its correctness.

"To persons residing in the country, and especially to clergymen and others, whose advice and influence in their respective neighbourhoods may lead to the improvement of the less educated, it is considered that such a publication may prove valuable. At the same time, the low price at which the uncoloured copies are issued will place it within the reach of the school library, and thus tend to render service to the rising generation. The knowledge once implanted, that many of the most admired ornaments of our fields, and woods, and gardens, not only contain within them the elements of disease and death, but that these are in many instances of a character so powerful as to render the fragment of a leaf, stem, or root, a few seeds or berries, almost immediately subversive of human life, cannot fail to instil caution into the most careless, and thus lessen the liabilities to danger by which we are surrounded."

In conclusion, we hope this little manual will be the means of saving many a life, which, through ignorance of its contents, might otherwise have been lost.

THE

NATURAL HISTORY REVIEW.

PROCEEDINGS

OF

The Dublin Natural History Society, and the Dublin University Zoological Association,

FOR THE SESSIONS 1855-56.

With Woodcuts and Lithographic Illustrations.

VOL. III.

LONDON:
WILLIAMS AND NORGATE,
14, HENRIETTA-STREET, COVENT GARDEN.
EDINBURGH: WILLIAMS AND NORGATE.
DUBLIN: HODGES, SMITH, AND CO.
1856.

INDEX TO PROCEEDINGS.

PAGE.

Achlya prolifera *Esenbeck* 57
Address, Anniversary of President of Dublin University Zool. Association . 1
Agalma Gettyana, found in Belfast Bay 74
Albatross, range of 25
Albino variety of Razorbill,—of Magpie 62
American Bittern, occurrence of, in Ireland 26
Anatomy of Orphnephila testacea 72
„ of Pulex canis 13
Andaman Islanders, account of the 35
Andrena hattorfiana, angulosa (helvola), nigriceps, aprilina, schranckella, analis, separata, labialis, convexiuscula, argentata 69
Andrews, W.; on Ferns of Killarney 53
„ On rare Irish Butterflies 68
„ Remarks on the genus Skua 51
„ Remarks on Moths injurious in Granaries . . . 63
Anodon cygneus, locality of, near Finnoe 19
Anthrocera minos, distribution of, in Ireland 73
Aphaniptera, structure and affinities of the order . . . 9
Arctic Regions, Captain M'Clintock's Diary of Expedition in . . 40
Argynnis lathonia, and other rare British Butterflies . . . 71
Aspsenium anceps, grows in Kerry 53

Ball, R., Pres. of Dublin University Zool. Assoc.; Anniversary Address . 1
„ on *Echinus lividus* and *Sciæna umbrina* . . . 70
Bees, rare British, localities and dates of capture . . . 69
Birchtree Polyporus, grows at Killarney 46
Bittern, American, occurrence of, in Ireland 52
Black-tailed Godwit, shot near Dundalk 52
Botaurus stellaris 52
Botrychium Lunaria, systematic place of 55
„ remarkable varieties of 65
Botrychium rutaceum, synonyms of 67
Brambling, occurrence of, in Ireland . . . 26, 52
Bridled Guillemot, occurrence of, in Ireland 24
Bulfinch, occurrence of, in Ireland 27
Burkitt, Dr.; on rare Irish Birds 26
Burrowing Sea-urchin 70
Butterflies, rare British 69
„ rare Irish 68

PAGE.

Callao, Natural History of 25
Carte, Dr. A.; Bridled Guillemot and its eggs . . . 24
Cattoo Coorumbers, account of the 34
Celtic names of the water newt 38
Ceylon Asiatic Society's Transactions, extract from . . . 28
,, tree frogs of,—Hylidæ 22
,, Veddahs, or wild natives of 27
Change of colour in a fowl, without moulting . . . 60
Chenalopex ægyptiacus, occurrence of, in Ireland . . 52, 53
Clunio marinus, and C. adriaticus 72
Clermont, Lord; Notice of rare Irish Birds, presented to the Dublin Natural History Society 52
Cœlioxys rufescens, vectis, locality of, in England . . . 69
Coleoptera of Dublin District, supplementary list . . . 71
Collection and preservation of specimens of Natural History . . 5
Comparative Anatomy, use and misuse of 6
Crustacea Podophthalma of Ireland 65

Dale, J. C.; Correspondendence, rare British Bees . . . 69
,, ,, ,, rare British Butterflies . . . 71
,, ,, ,, Entomological Diary . . . 73
Davis, Robert; Obituary 2
Derrig na Diaoul, Irish name of Staphylinus olens . . . 38
Destruction of Animals, unnecessary 3
Diary of Expedition in the Arctic Regions 40
Difficulty (supposed) of finding subjects for study . . . 3
Diglossa mersa, larva of 20
Disease of Bones of Red Deer 52
,, of Fishes 56, 70
Donations to Library of Dublin University Zoological Association 7, 69, 71, 72
,, to Museum of Dublin Natural History Society . . 52
Dredge, improved, and method of using 4
Dublin, Coleoptera of the neighbourhood of 71
Dublin Natural History Society, Accounts 44
,, ,, ,, Anniversary meeting, 1855 . . 43
,, ,, ,, Election of Members . 44, 45, 48, 52, 56, 62
,, ,, ,, ,, of Officers . . . 44
,, ,, ,, Ordinary meetings . 45, 48, 52, 56, 62, 65
,, ,, ,, Popular meetings . . 44, 45, 56, 65
Dublin University Zoological Association, Anniversary meeting, 1855 . 1
,, ,, ,, Constitution and rules of . 1
,, ,, ,, Election of members . 27, 72
,, ,, ,, Ordinary meetings 21, 27, 69, 70, 71, 72
,, ,, ,, Members lost by death . . 2

Earc, Irish name of Lizard 39
Eas, or Eascu Luachra, Irish name of the Lizard . . . 38

PAGE.
East India Company's Service, Examination for . . . 7
Echinus lividus, a burrowing sea-urchin 70
Egyptian goose, occurrence of, in Ireland . . . 52, 53
Endrosis fenestrella, injurious to grain 63
Enterolithes 47
Excursions for Natural History objects 4
Extinct Mammalia 3

Falco peregrinus, occurrence of, near Armagh . . . 52
Farran, Dr. C.; on the genus Skua 48
Ferns of Killarney 53
Finnoe, fresh-water Mollusca of 19
Firbolgs, physiognomy of the 36
Fitzgibbon, Dr.; Antelopes' horns brought by him from Africa . . 23
Flea, structure, metamorphosis, and systematic affinities of the . . 9
Float of Stephanomia 74
Forbes on the use of Museums—extract 6
Forbes, Edward; Obituary 2
Fork-tailed petrel, occurrence of, in Ireland 26
Frazer, Dr.; on a disease of gold fish 56
Fringilla montifringilla, occurrence of, in Ireland . . . 52
Fungi of the South-west of Ireland 45

Garrett, James; Obituary 2
Gayal, horns of the, infested by insect larvæ 23
Gilling, Rev. J.; account of the Veddahs 28
Gold fish, disease of 56
Gonepteryx rhamni, occurrence of, in Kerry—near Dublin . . 68
Grain in granaries injured by moths 62
Guillemot, bridled, occurrence of, in Ireland 24
Gull, the Little, occurrence of, in Ireland 27
Gull, the Red-necked, occurrence of, in Ireland . . . 26
Gulls feed on Lemings 42
Gulls, change of plumage with age 25

Halictus quadricinctus, in the Isle of Portland . . . 69
Haliday, A. H.; on the Affinities of the Aphaniptera . . 9
,, on Two Coleopterous larvæ 20
,, on Two Species of Irish Diptera . . . 72
,, on Lepidopterous larvæ in the horns of Antelopes . 23
,, on the Classification, &c., of the Rotifera . . 70
Harelda glacialis, occurrence of, at Lurgan green . . . 52
Haughton, James; on Moths injurious to grain in granaries . . 62
,, on rare Irish Birds 52
Haughton, Rev. S., on Spodumene and Killinite . . . 64
Helix aculeata 19
Hogan, Rev. A. R.; Coleoptera of Dublin 71
Hoppoe, occurrence of, in Ireland 26

PAGE.

Hipparchia Cassiope, and other rare British Butterflies . . 73
Hyla, ova of, deposited out of the water 21
Hylidæ of Ceylon 22

Ignorance as to the Injuries caused by Animals . . . 8
Irish names of Animals 2
Irish, origin of the 37
Ivory Gull, nest of the 42

Jameson, Robert; Obituary 2
Johnston, George; Obituary 2

Killinite, an altered (hydrated) Spodumene 64
Kinahan, R. J.; correspondence from Callao . . . 24
,, on Irish Ferns 55
,, on Wanderings of Birds 55
,, on the varieties of Botrychium Lunaria . . 65
,, on the Crustacea Podophthalma of Ireland . . 65
Kolus ellipsiprymnus, horns of, attacked by an insect larva . . 23

Lamprey, Dr. J.; on the ova of Hyla 21
,, on the Veddahs of Ceylon . . . 27
Larvæ of Moth infesting the horns of Antelopes . . . 23
Larus, change of plumage in birds of the genus . . . 25
Larus eburneus, nest of 42
Lemings, the food of Gulls, &c., ... 42
Leptomitus clavatus, prolifer, ferox *Ag.* piscicola *Berkley* . . 57
Lestris, or Skua, habits of 48
Leuciscus phoxinus, disease of 70
Library of D. University Zool. Association, Donations to 7, 69, 71, 72
Limosa Melanura, occurrence of, in Ireland . . . 52
Little Gull, occurrence of, in Ireland 27
Lizard, Irish names of 39
Local and Irish names of animals 2
Long-tailed duck, occurrence of, in Ireland . . . 52
Lunaria minor, Doody, Ray's Synopsis Plantarum . . . 67
Lycaena dispar. and other rare Lepidoptera . . . 73

M'Clintock, Captain; Extracts from his Diary in the Arctic regions . 40
Madeira and South West of Ireland, similarity of vegetation of . 53
Magpie, Albino variety of the 62
Malpighian vessels, number of, in Hymenoptera, &c. . . 17
Mancipium Daplidice and other rare British butterflies . . 71
Megachile circumcincta, leachella, localities of, in England . . 62
Melbourne, Natural History of 24
Melville, A. G.; on a species of Stephanomia from Dublin Bay . 74
Mergus albellus, occurrence of, in Ireland . . . 52
Microscopical Society and Dublin Nat. Hist. Society, union of . 44
Minnow, disease of the 70

PAGE.

Montgomery, R. J.; on the effect of abstracting eggs from nests . 62
" on change of colour in birds, and edge-moulting . 61
" occurrence of the Egyptian goose in Ireland . 53
Moths infesting the horns of Ruminants . . . 23
" injurious to grain in granaries 62
Mountain finch, occurrence of, in Ireland . . 26, 52
Muscicapa griseola, weeds in Co. Louth . . . 52
Musk bull, manners of the 41

Natural History Review 1
Naturalists, union among, recommended . . . 8
Neligan, Dr.; remarks on horns perforated by grubs . . 23
Night heron, occurrence of, in Ireland 52
Nomada baccata, roberjeotana, localities of, in England . . 69
Nycticorax europaeus, occurrence of, in Ireland . . 52

Ochthebius punctatus, larva of . . . , . 20
Oecophora pseudospretella, injurious in granaries . . . 63
O'Mahony, Th.; on some Celtic names of the water-newt . . 38
Ophioglossum vulgare, systematic place of 55
Orders of insects, succession of 18
Oreas Canna, horns of, attacked by moths . . . , 23
Orphnephila testacea, Anatomy of 72
Osmia bicolor, localities of, in England 69

Pamphila linea, occurrence of, at Kinvara, County Galway . . 73
Pastor roseus, occurrence of, in Ireland . . . 52
Peregrine falcon, occurrence of, near Armagh . . . 52
Periodical phenomena, observations of 5
Petrel common and fork-tailed, occurrence of, in Ireland . . 26
Pica melanoleuca, Albino variety of 62
Polyporus betulinus, grows about Killarney 46
Popular Meetings of Dublin Natural History Society . . 44, 45, 56
Practical application of Zoological science 7
Preservation of specimens of Natural History 5
Procellaria leachii, occurrence of, in Ireland 26
Protection of animal life 3

Razor-bill, Albino variety of 62
Red Deer, disease of the foot-bones of 52
Rednecked Gull, occurrence of, in Ireland 26
Report, annual, of Dublin Natural History Society . . . 43
Rose-coloured Pastor, occurrence of, in Ireland . . . 52
Rotifera, Organization and Classification of 70
Ruff, occurrence of, in Ireland 26
Saprolegnia ferox producing disease in fishes 56
,, xylophila, capitulifera 57
Sciæna umbrina, occurrence of, in Cork harbour . . . 70

PAGE

Scoter, occurrence of, in Ireland 26
Seal holes in the ice 41
Singalese, characters of the 28
Skua, occurrence of, about Tramore, County Waterford . . 26
,, habits and change of characters, with age . . . 48
Smew, occurrence of, in Ireland 52
Smith, Professor R. W.; on Enteroliths 47
,, ,, on a disease of the foot-bones of the red deer . 52
Specimens of Natural History, preservation of . . . 5
Spodumene, analysis of 64
Spodumene and Killinite, specific identity of . . . 64
Spotted Flycatcher, breeds in Co. Louth 52
Spotted Water Rail, occurrence of, in Ireland . . . 26
Stephanomia contorta found in Dublin Bay 74
Succinea oblonga *Drap.* 19
Swimming Organs of Stephanomia 74

Thecla Betulæ, occurrence of, in Kerry 68
Tinea granella, cloacella, destructive in granaries . . 63
Tree Frogs of Ceylon 22
Trial of a Veddah for Homicide 34

Union among Naturalists, recommended 8
Uria lacrymans, occurrence of, in Ireland 24
Urticating Organs of Stephanomia 74

Vaucheria aquatica *Lyngbye* 57
Veddahs of Ceylon, characters of 27
Vertigo substriata, localities of, in Ireland 19

Waller, Edward; on the Fresh-water Mollusca of Finnoe . . 19
Wanderings of Birds 55
Water Newt, Celtic names of the 38
Water Rail, Spotted, occurrence of, in Ireland . . . 26
Williams, R. P.; on Change of Colour in a Fowl . . . 60
Wright, E. P.; on the Distribution of Anthrocera Minos in Ireland . 73
,, on a Disease of the Minnow 70

Yakko, or Demon of the Singalese 37

Zoology for Schools, by R. Patterson, circulation of . . . 7
Zoology, Reasons for the Study of 7

Proceedings of Societies.

DUBLIN UNIVERSITY ZOOLOGICAL ASSOCIATION.

NOVEMBER 16, 1855.

R. Ball, LL.D., President, in the Chair.

This being the anniversary meeting of the Association, the President proceeded to deliver the following address:—

At the close of the first session of the Association, many of its members will recollect that I had the pleasure of reading the heads of subjects which I had selected as proper to be noticed in an address on the objects, prospects, and progress of this Association; and at that time it was scarcely ripe for more.

Since then, constant pressure of other duties has caused me to postpone my intended communication, and I do not now regret it, as it enables me to congratulate the Association on the increased patronage and countenance it has received from the College authorities, as testified by the comfortable and well-lighted apartments in which we are now assembled. The members of this Association who have heard my former observations will, I trust, for the sake of their juniors, excuse the repetition of much of what I then said; while both will grant me indulgence for the imperfection of my present address, on the plea that I have really been recently much occupied in two matters, in which we all have an interest. These are—Firstly, in promoting the spread of knowledge; and, secondly, in aiding to give to those who possess it the advantages to which industry and talent always had a claim, but which claim hitherto has been too often unacknowledged.

The University Zoological Association, founded early in 1853, with the gracious approval of the Provost and Board of Trinity College, differs, you are aware, in its constitution from other societies. Its immediate object is to extend the knowledge of the zoology of our own island; but to do so effectively, it encourages the cultivation of general systematic zoology, and the application to it of philosophic principles and inductive reasoning as its necessary and only sound basis. Those who have heard the results of great learning and acute generalisation frequently applied in discussions which have arisen on papers read before us cannot doubt that zoology, thus cultivated, deserves the place to which it is rapidly rising in the scale of natural sciences.

I may remind you that the Association consists of—1st, ordinary members, who must be students of Trinity College, and whose number it was found necessary, for various reasons, to limit to 32; 2nd, honorary members, being older naturalists, residing in or near Dublin; 3rd, corresponding members, being distinguished persons, who are willing to promote the objects of the Association, or those who, having been ordinary members, have graduated and left college.

The main feature of this plan is, that the ordinary members, limited to 32, are, as it were, representatives of the counties of Ireland; and, were the list full, on a vacancy, preference would be given, *ceteris paribus*, to a student from an unrepresented county. The object of this arrangement is, that a wide-spread organisation of corresponding members should be established, trained in one school, and capable of making general observations on one principle. From this plan we may look forward to a time when zoological observations can be usefully conducted, and communicated to the Association as a common centre. But more of this hereafter.

The progress of the Association in useful results has been greater than I could have anticipated. It has, as I have before stated, received the necessary and much-valued sanction of the Provost and Senior Fellows; has had the countenance of very many of the most eminent naturalists; has been honoured by the presence of several distinguished non-resident men of science; and has had the zealous service of its youthful officers. As to the work done, I can give you little more than a list; but it is one which is most creditable. For the greater number of papers, *in extenso*, I, with pleasure, refer you to the "Natural History Review," a work deservedly rising in estimation, useful in its object, and highly creditable to the energy and ability of its editors. As I cannot claim the slightest credit for originating this much-wanted work, I can the more strongly urge the necessity of your supporting it by your subscription, and a small one it is. Besides a full record of

the transactions of this Association, some parts of which have already been translated into foreign tongues, it gives you the proceedings of the other Irish societies promoting natural history, as well as notices of periodicals, and well written reviews of books on natural science.

Short though the career of the Association has been, it has to mourn severe losses, irreparable, perhaps, in this generation. The first name death took from our list was that of the amiable and accomplished Dr. Drummond, of Belfast. No man was ever more desirous of spreading a taste for the study of natural history; and while doing so, he added to the store. His career having been already recorded, I briefly allude to it, reminding you that he accomplished much under circumstances in which ordinary persons would have supposed they could do nothing.

Mr. Robert Davis, of Clonmel, a Quaker, and in trade, devoted much time and attention to the collection of zoological specimens, and to obtaining accurate information respecting them. The Association lost in him a useful correspondent. He possessed considerable energy, coupled with no ordinary worth of character. I received a letter from him a short time before his death, in which he spoke of its approach with a calmness becoming a philosopher of his persuasion.

Professor Jameson's time-honoured name was enrolled in our lists. His generous permission to place it there was a recognition of the value he set on the pursuits of the Association, of which it may be proud. To call your attention to his well-known merits as a philosophic naturalist would be to tell what all men know.

Next went his bright successor, the much-loved Edward Forbes, who, having obtained the Edinburgh chair, opened for a few months the prospect of a course of unexampled usefulness. His brilliant career was suddenly terminated. We cannot forget the interest he took in our proceedings, the advice he gave us, and the lucid observations he made at the meetings at which he was present; had he lived, we should have had still greater proofs of the interest he took in our welfare. Though no naturalist has died in our time of whom so much has been written, I feel it is a subject which, to enter on, would lead us far into the night. I knew him well; and he has left a blank which his friends will find it hard to fill.

The next name struck from our list is that of Mr. James Garret, an energetic and honest attorney, whose recreation was practical ornithology. My much-loved friend, W. Thompson, confiding in his ability, named him as one of his executors for the publication of his posthumous works. With great care he and his co-executor gathered poor Thompson's MSS. together, had them arranged and transcribed; but as they were ready for the press, fever carried him off. However, the book in question will probably make its appearance in a few months.

Our melancholy list closes with the name of Dr. George Johnston, of Berwick—a man who, perhaps, more than any other, promoted the cultivation of native zoology. Struggling under straitened circumstances, which called for much personal exertion, he yet contrived to give to the public a number of excellent works. He led and kept together a band of naturalists in his own neighbourhood, and encouraged many at a distance. His manner and disposition were as prepossessing as his knowledge was sound, and he died deservedly regretted.

Of the distinguished men of whom I have thus made mention, all save Professor Jameson were comparatively young men; but they did much. When and where shall we look for fit successors? This I know, that these men made their great progress by positive hard work, and earnest study. None of them ever sought spurious credit by decrying the work of others, or by appropriating it. On the contrary, dear and personal friends as they were of my own, I have seen how they endeavoured to place to the credit of every man his just share, and how they preferred encouraging their friends to take up subjects in which they were themselves engaged, their desire being to add to the real working body. This is a spirit quite contrary to that of pseudo-naturalists, whose practices we cannot too strongly discountenance.

LOCAL AND IRISH NAMES.

The members of the Association may, with little trouble, contribute to perfect a list of the names of animals in the Irish tongue. These names are fast disappearing, and if lost will be irretrievable. I have taken much pains to collect

information on the subject. It is one which is interesting to Philology and Topography, as well as to Zoology. I have obtained in my examination many proofs of this, and have also found that names of animals exist in some of the ancient manuscripts which we cannot now translate; and names of species appear which have altogether disappeared from the country, and others of animals which we have been led to believe were of recent introduction; the gray rat, for instance, is mentioned with the black rat in a poem written in the 7th century.

It is also very desirable to collect the local vulgar names of animals. It seems somewhat remarkable that within much of the English pale, we find birds, &c., called by Irish names, while in the more Irish parts of the country English names, sometimes incorrectly applied, are in common use. Records of such facts are very well worth preserving.

EXTINCT MAMMALIA.

The attention of members of the Association may be usefully directed to the observation of mammalian remains found in bogs. When the head and horns of a giant deer are found they attract the attention of the neighbourhood; while nobody appears to observe the hornless skulls found in the same locality. Thus for many years it was supposed that the females of the species had horns; now we know that these deer followed the same law as their present representative, the fallow deer.

The existence of bears was denied; but it has recently been proved that they were contemporaries of the giant deer. We have proofs of wolves and foxes, of a remarkable race of short-horned cattle, various goats, horses, and deer; but we have no proof of the existence of the celebrated wolf-dog, nor of the beaver, by the production of any of the osseous remains. May I suggest to members to examine carefully any discoveries of bones they may chance to be cognizant of, for the desiderata I have referred to, or for any other species than those I have enumerated as already well known. It may be well here to urge that in any examination of the deposit where bones are found, accurate observations should be made as to whether the ground has before been turned up by man. I have reason to believe that much crude theory has been the result of want of care in this respect; for, so far as I have been able to trace the occurrence of the bones of giant deer in connection with human remains, they appear to have been thrown up in the making of trenches round the fortified islets so common in our country; thus, it would be as correct to consider the last thrown-up shovel full of clay from a trench at Sebastopol as coeval with the military weapons it perhaps covered, as to imagine that an elk's horn thrown from the marl at the bottom of a dyke was contemporary with the implements of the recently constructed island fort which it helped to form.

SUPPOSED DIFFICULTY OF FINDING SUBJECTS FOR STUDY.

Persons are not unfrequently heard to complain that they are so circumstanced that they have no opportunity to pursue any study in zoology: there is no person really so circumstanced. The prisoner in his dungeon studied, to advantage, the natural history of a solitary spider. I know a lady who made a collection of 200 species of insects on the windows of her drawing-room in this city. I recollect, when sitting on an old ivy-clad gate pier on a hill over the sea, a resident gentleman said to me, he should like to know something of the land and fresh-water mollusks, but that there were none in that region. I replied there are, and several species, too, on the structure on which we are sitting. I proceeded to examine, and found no fewer than eight living species; while in a bog, just close at hand, were four or five more. I could enumerate many other cases, proving that where there is a student of zoology, there are always subjects of study.

UNNECESSARY DESTRUCTION OF SPECIES.

I would venture to urge on the members of the Association that they should consider themselves the protectors of animal life. Associations for the protection of game are common; why should not naturalists unite to prevent the annihilation of rare species, many of which are useful, not a few ornamental, and none more mischievous than foxes, hares, and pheasants. Waterton protected all animals

that pleased to take shelter at Walton Hall, and the result was very pleasing; he had about him birds of the most interesting kinds, whose manners he could thus observe. There is much brutality in shooting down birds merely to say how many you have destroyed; but as I have elsewhere urged this at length, I shall not further allude to it; and it is fully treated in the Rev. Dr. Drummond's interesting work entitled "The Rights of Animals." Could the Association be induced to undertake the protection I propose, and should it spread (as I fervently hope it may), many useful and interesting species of birds, now rare, may, if treated as kindly as the robin, become as common.

DREDGING.

I would particularly desire to direct the attention of the Association to marine dredging, philosophically carried out; it throws light on many difficult geological and geographical points. Members of the Association desirous of undertaking dredging with these views, can obtain assistance and direction from the reports and papers issued by the Dredging Committee of the British Association. With the more strictly zoological objects, dredging affords ever varying and delightful occupation; but, as in all other pursuits, a little practice and the exercise of some judgment is necessary to secure its best results. I have myself paid much attention to facilitating the use of the dredge, and have successfully overcome all the difficulties that have presented themselves to me; so that what was, when I first attempted it, a heavy labour, not devoid of risk, and uncertain in its results, is now a matter of little trouble. There are many things to be attended to in dredging. On one occasion a gentleman in the boat with me, of a mechanical turn, thought the fitting of the dredge was a bad piece of work; being loose, he diligently fastened it; some time elapsed before I found it out, and for that period all our labour was vain. Again I was induced to have the dredge nets made of very strong whip cord, as an improvement. When this got wet it contracted and twisted so much that in some cases the dredge was useless. Mr. Eyton, aware of this defect, makes his nets of a twine composed of a great number of threads very loosely twisted together. My last improved dredge has the knives parallel, the arms about the length of the knives, and connected together by a chain as long as one arm. The whole is galvanized, and thus the destruction caused by rust to the net prevented.

EXCURSIONS.

As to one of the most pleasing prospects of our Association, I look forward to excursions of its members. My avocation hitherto has much interfered with my taking part in such things; but I have been sometimes so indulged, and I can recall with great gratification the pleasure they afforded, and can testify to their value in the communication of knowledge. I have found, speaking of myself, that I was enabled to ask for information from, probably, the best authority, and to seek explanation of difficulties with a freedom which a more formal meeting would not permit. In fact, I could there get over the fear of showing my ignorance, and such fear is one of the greatest drawbacks in the acquirement of knowledge.

The excursions of the Berwickshire Naturalists' Club, of the classes of the professors of Botany, of the Linnean Society, and of the sections of the British Association, have always been of the most delightful interest, highly conducive to intellectual progress, and to the cultivation of social friendships. I have often desired leisure for writing plans of such excursions round Dublin. I think it would be advisable, with this view, that the Association undertook to collect materials. We have many local lists; but what we want is a guide to show where, how, and when, we should look to find the objects of our study in their native habitats. It is true that when a good practical naturalist joins a party on an excursion in a district which he well knows he is able to point out much to interest his companions; but what I want is such a guide as will enable the young naturalist to go and train himself when he cannot have help from others. Solitary rambles are, when employed in natural history, very instructive.

I recollect when I was but a child the many delightful days I spent in examining animals on the shore, and I am conscious of having at that time seen

many rare species, not a few of which have since been brought forward as recent discoveries. I may instance one—the Cydippe pomiformis—which I distinctly recollect to have seen when I was not five years old: I found it in a pool, and brought it to my father as the lens of a haddock's eye which had come to life. I quite remember its cilia and irridescence, and how deeply I was absorbed by its beauty.

PERIODICAL PHENOMENA.

One object which can be well carried out by our Association, when it comes to be fully developed, is the observation of periodical phenomena; such as the migration of fishes and birds, and the appearance of certain insects at intervals. Though much has been attempted by Quetelet, De Selys-Longchamps, and the British Association, and, in meteorology, by the Royal Irish Academy, as well as suggestions at various former times by others, yet little has been accomplished, rather from a want of the proper machinery than from any lack of zeal, or of due appreciation of the subject. I trust our Association will supply the want. When we are matured, we shall have a band of well-trained observers scattered through the land, who will be enabled to act with one accord; and fitted, by their study of physics in the University, to make proper meteorological observations in connection with the phenomena of animal life, I hope we shall, by persistence, record useful results.

The Council of the Association have had the subject under consideration, and when the proper time arrives, will be prepared to issue tables and instructions for observers. I may remark that, hitherto, a great preventative of meteorological observation has been a belief that costly and delicate instruments, and difficult observations, are necessary. Now, however desirable such refinements may be, in a theoretical point of view, I do not believe they are necessary in a practical one; but that for all useful results, the expenditure of a few shillings would suffice to form useful observations. I do not speak without thought on this subject, having, more than thirty years ago, employed myself in constructing simple instruments, and having since vainly endeavoured for the establishment of permanent observatories, through the agency of the National Schools.

However, observations on the migration of birds, and other zoological phenomena, require no instrumental aid; and I urge on our members carefully to note such facts as they may be able to observe. I lay before the Association a few of the most scientific instructions for observation in this matter; amongst others, the directions drawn up by a committee of the British Association, about ten years since. In that short space three of its youngest and most distinguished members are gone—Thompson, Strickland, and Forbes. Take their report as a valuable legacy to science.

COLLECTION AND PRESERVATION OF SPECIMENS.

Believing that the promotion of our propensity for hunting and acquiring property in animals is the easiest mode of entering youth on the road of zoological study, I venture to offer to the Association directions for the collection and preservation of animals of various classes. These directions have, for the most part, been published in my reports on the University Museum, and have since been republished in other forms by eminent authority.

I consider, that though a mere collector of curiosities is open to some of the censure often cast upon him, and though, from his usually being miscalled "naturalist," much injury results to those deserving that appellation, by being thus unscientifically classed, yet I think that the naturalist owes much to the collector, and that many a boy has commenced as a collector who has ended as a philosopher. It is, therefore, well to encourage the taste for making collections, even were it only as an amusement. It has less to be said against it than many of those recreations which are more common.

MUSEUM.

The connection of the Association with the Dublin University Museum cannot but prove useful to it, and it has, in the course of the discussions which have arisen, greatly benefited from the collection in almost every subject brought under your notice. The members, therefore, will recollect that, in adding to the Museum they aid themselves, and will always find me anxious and willing to assist them. In reference to the uses of Museums, our lamented friend Forbes wrote—

"Museums, of themselves alone, are powerless to educate, but they can instruct the educated, and excite a desire for knowledge in the ignorant. The labourer who spends his holiday in a walk through the British Museum cannot fail to come away with a strong and reverential sense of the extent of knowledge possessed by his fellow men. It is not the objects themselves that he sees there and wonders at that make this impression, so much as the order and evident science which he cannot but recognize in the manner in which they are grouped and arranged He learns that there is a meaning and value in every object, however insignificant, and that there is a way of looking at things common and rare, distinct from the regarding them as useless, useful, or curious, the three terms of classification in favour with the ignorant. He goes home and thinks over it; and when a holiday in summer or a Sunday afternoon in spring tempts him, with his wife and little ones, to walk into the fields, he finds that he has acquired a new interest in the stones, in the flowers, in the creatures of all kinds that throng around him. He can look at them with an enquiring pleasure, and talk of them to his children, with a tale about things like them that he had seen ranged in order in the Museum. He has gained a new sense, a thirst for natural knowledge, one promising to quench the thirst for beer and vicious excitement that tortured him of old. If his intellectual capacity be limited and ordinary, he will become a better citizen and happier man; if in his brain there be dormant power, it may waken up to make him a Watt, a a Stephenson, or a Miller.

It is not the ignorant only who may benefit in the way just indicated. The so-called educated are as likely to gain by a visit to a Museum, where their least cultivated faculties, those of observation, may be healthily stimulated and brought into action. The great defect of our system of education is the neglect of educating the observing powers—a very distinct matter, be it noted, from scientific or industrial instruction. It is necessary to say this since the confounding of the two is evident in many of the documents that have been published of late on these very important subjects. Many persons seem to fancy that the elements that should constitute a sound and manly education are antagonistic—that the cultivation of taste through purely literary studies, and of reasoning through logic and mathematics, one or both, is opposed to the training in the equally important matter of observation, through those sciences that are descriptive and experimental. Surely, this is an error! Partizanship of the one or other method, or rather department, of mental training, to the exclusion of the rest, is a narrow-minded and cramping view, from whatsoever point it is taken. Equal development and strengthening of all are required for the constitution of the complete mind; and it is full time that we should begin to do now what we ought to have done long ago."

I may add that, in the University Museum is the largest collection ever brought together of the Fauna of Ireland, and a most remarkable feature in this department is the accumulation of fishes, for which the Board have provided a spacious, but yet unopened gallery; in this I hope native ichthyology will be fully displayed before the expected visit of the British Association in 1857.

COMPARATIVE ANATOMY.

It seems fitting that I should offer a few observations on the higher pursuits of zoology. In having so much dwelt on the modes and objects of making collections, I have followed the course pointed out by the illustrious Mrs. Glass, who tells us first to catch our hare, and then how to cook it. We shall find that, having made our collections, we must call in comparative anatomy to aid us in classification. At the same time, we should not be led away by those who, dazzled by the genius of Cuvier, despise the study of the habits and external appearance of animals, a proceeding which Cuvier never would have sanctioned. A mere comparative anatomist is not a zoologist: there are many strange anomalies which would lead him quite astray; and did he depend solely on comparative anatomy, he would find himself predicating the habits of animals at total variance with the real facts; at the same time, no one can be entitled to the name of a naturalist who is not acquainted with this subject. An accomplished naturalist is a very great rarity, and we must content ourselves by joining together to try to make up as a whole what we cannot turn out as an individual. Having accomplished comparative anatomy, and, guided by observation, having acquired a fair insight into classification, we have

to study habits and geographical distribution—thence physiology, embracing all the phenomena of organized being, until we arrive at the highest flights of metaphysics. Not till then can we with propriety call ourselves zoologists.

REASONS FOR STUDYING ZOOLOGY.

It would seem unnecessary to say one word, in these days, to urge the value of zoological pursuits, more particularly before a body self-formed for their promotion; yet I had intended to have dwelt on this subject.

On looking into Swainson's discourse on the study of natural history, with a view rather to take some new ground, I find so many of the arguments I had intended to have used collected there, that I refer you to the book, in order that, should ignorant persons venture to sneer at your pursuits, you may refer them to a work which, though not free from faults, has the merit of being easily accessible. For my own part I can say, though I have spent much time in zoological pursuits, by stealing a large part of it from night, I have contrived to neglect no duties, and have chiefly used for the purpose those hours which are too often devoted to card-playing, dancing, or more unprofitable amusements, by persons who deride our pursuits. But, to use the forcible language of a most distinguished lover of science, "Their envious ignorance vainly strives, by idle mockery, to undervalue what it cannot understand." My energetic friend, Robert Patterson, one of our corresponding members, has, by his various publications, done more, perhaps, than any other living person to make zoology popular. He has brought together many strong arguments for the use of natural history in general education; and his excellent work on zoology has already reached, in its onward progress, a circulation of 20,000 copies. On the walls around us hang his series of diagrams, just published by the Board of Trade, and you will observe that nothing of the kind so good has before appeared. I may refer to one difficulty which has retarded the advance of zoology—it is, that not being a regularly cultivated study in the great seats of learning, the eminent individuals controlling these establishments are, consequently, to a great extent, ignorant of its educational value. But this time is passing away; the doors for its admission are opened at Cambridge, are opening at Oxford, and here we have made good progress; while, in the newer institutions, zoology takes rank with its kindred sciences; indeed, it is hard to explain why it has not been always co-equal with botany, long and deservedly a favourite study in schools. However, the steady advance of zoology is now certain, and must be much accelerated by having a value assigned to it in the India Civil Service examination, and by the assertion of the medical examiners of the East India Company, that proficiency in zoology will be entitled to great consideration—that they desire to encourage all candidates to acquire an elementary knowledge of the principal natural families of plants and animals, and that they are anxious to promote the study of natural history, as a most important adjunct or preliminary to a liberal medical education, considering comparative anatomy, zoology, and botany, if properly cultivated, by means of specimens, for even a short period, to be eminently calculated to develope habits of close observation, and to strengthen powers of reasoning upon observed facts.

LIBRARY.

The Council have considered it advisable to form a Library. In this I join with them, having myself, in my early pursuit of Natural History, felt greatly the want of books of reference. The funds of the Association being necessarily very limited, the purchase of books to any extent is, therefore, out of the question; but the honorary and corresponding members may, by giving copies of works of which they are authors, or of their duplicates, aid the Association, without cost to themselves, and greatly to the advance of Zoological knowledge. I may add, that already, without any direct application, many useful, and some valuable works have been presented.

PRACTICAL APPLICATION.

In the practical application of zoological knowledge much is to be done. The breeding of eels is still a matter of obscurity; and in the history of the salmon much is still to be learned. The means of staying the ravages of turnip flies, wire worms, caterpillars, &c., are to be sought in a true knowledge of the insects in their different states. I should not omit the Silpha opaca, the larvæ of which have been latterly

ravaging the mangold wurzel. This insect, carnivorous in its perfect form, is herbivorous in the state in which it is so injurious to the farmer. Is there not here a means of reducing its numbers? May not the perfect insects be trapped at an early period of the year by carrion, and so prevented spreading their mischievous hoards? You doubtless recollect that when the dockyards at Sweden were infested by a beetle, whose larvæ threatened to destroy the valuable stores of timber therein, Linneus being applied to, directed that at the breeding time of the insect in question the timber should be submerged. The advice was followed, and the ravages complained of stayed. Many persons ignorantly seek the destruction of small birds on account of their depredations on corn and other seeds; but a little attention will show that even a common sparrow in its destruction of the ordinary cabbage butterfly for the purpose of feeding its young ones, renders greater service to us than would recompense the cost of feeding it on good grain the whole year round. It appears to me this year that the injuries of caterpillars have been greater than I ever before observed. I attribute this to the destruction of small birds in the severe frost of last winter, when the eggs and pupæ of the insects escaped, while the restraining power provided by nature was seriously curtailed. Instances have been stated where the introduction of one animal, injurious and unpleasing in itself, has been found to be the best method of getting rid of some other more unpleasing and injurious. It is probable that stricter attention to this subject would enable us to check the increase of those creatures from which we suffer most at present. Lamentable ignorance prevails on this subject. I had some time since a number of insects sent me charged with destroying wheat; they were Ichneumons, which had been hatched in the body of the destroyer, a Chlorops. Only one specimen of the latter was taken by the farmer, and he could not believe that this bright fellow was his enemy, and that the many black fellows were his active allies and friends. In the gardens in the south of Ireland are to be found lurid looking slugs, which are diligently chopped up by the gardener; yet not one of these slugs ever tasted any of his choice plants. On the contrary, their sole food is earth worms. How slow-moving creatures as they are can catch these much more active animals I know not; but I have repeatedly proved the fact—finding either an earth worm half swallowed, or if entirely engulphed it has been cast up on placing the slug (Testacellus) in spirits. The frog, too, suffers from ignorance; it is accused of eating strawberries, and even gardeners will show you where they saw a frog bite out a piece; but if you look at this hole you will find it a sort of cave, the exterior smaller than the interior, and hence it could not be bitten out. The real fact being that the frog had with a dash of his tongue just licked out a little black slug which had entrenched itself in the fruit, thus rendering a positive service to the man to whose ignorance it fell a victim.

The hedgehog, too, is destroyed for eating apples, while the fact is no hedgehog ever eat an apple; it feeds chiefly on worms, but will eat a frog, mouse, small bird, or any other animal it may happen to get hold of. Thus, we have many examples of ignorance which it is the business of a zoologist to dispel; while we have great reason to think that there are many applications of zoology yet to be learned, such as I have alluded to, where one animal may be employed in our service to restrain another. We use cats to kill rats, ducks to eat snails, turkeys to destroy the larvæ of cockchafers, and why not employ carnivorous beetles to destroy plant-eating insects? and why not find a natural enemy for the turnip fly? The list is a long one.

CONCLUSION.

Finally, I would earnestly urge on you to recollect that "union is strength;" we should have no rivalry either amongst ourselves or with other bodies, yet we may virtuously emulate and strive who shall do most. A desire to know all that human nature can know is one of the worthiest and loftiest of aspirations, and the most noble use, if it be not the positive duty of knowledge, is, to communicate it to others. In the "good old times" when benevolent fairies wished to show the vanity of human desires, they gave permission to individuals to have their three first wishes fulfilled: we read that the result was, to use the third wish to replace the party in *statu quo* as before the boon was granted. When a boy, I used to think I would overreach a fairy venturing to give me three wishes, by desiring, first, that I knew all that man can know; secondly,

that all other men knew as much; and then that I should wish no more. I now doubt that I would venture to accept the offer; I fear knowledge unwrought for is not to be desired. All useful and superior knowledge indicates and requires superior work. It is true some men have from nature greater fitness than others for acquiring knowledge, but when we look at the many who arrive at eminence by perseverance, against the greatest natural disadvantages, none need despair. Huber, a blind man, has given us the very best account of bees and ants. In our own college we know a classical tutor who never saw a letter. With such examples, may not those who have been favoured with the ordinary advantages of humanity hope to do great things. I know no good reason why a second Aristotle may not arise from amongst us. It is true we are not likely to have another Alexander for a scholar, to lend us the aid of some 1,500 men, and 800 talents; but we have an advantage above this, we have what still remains of Aristotle's own unrivalled works, which prove that as zoologist, and moral philosopher, &c., he has had no peer. We have all that has since been done, and we have his method, which was to observe facts with attention, to compare them with judgment, and to endeavour to arrive at general laws by their study. Let us follow his plan.

A. H. Haliday, Esq. A.M., M.R.I.A, V.P. of the Association, then read the following paper:—

ON THE AFFINITIES OF THE APHANIPTERA AMONG INSECTS.

It is not intended by this title to prejudge the question to which it refers; neither will I presume to deduce any categorical conclusion on the question, whether the group of fleas should obtain a place as a distinct order, or be associated with some of the orders of the Linnean system, as this is now accepted in its modified form. I propose rather to add from my own observations some little fresh materials for the use of better qualified judges. And the term Aphaniptera for the group is here adopted, simply as that best known to British entomologists, having been employed both by Curtis, Stephens, and Westwood, following Kirby, who first imposed the name. A few preliminary remarks may not be out of place here, historically regarding—*first*, the anatomy and natural history of these insects, and, *secondly*, the rank and place that have been variously assigned to the group in the system.

The physiology of insects had early shared the attention of philosophers. We must suppose that the mocking humour of the comic poet was not aimed at a purely imaginary butt, when he commended ironically the astuteness of Socrates in devising an empirical method of measuring the leap of a flea.* In after and better times, as Kirby and Spence have remarked, this has been done without incurring ridicule, and it has been estimated at two hundred times the length of the insect itself, and thirty times its height.† As if a horse should clear Nelson's pillar at a flying leap, and cover a quarter mile of ground at the stride. The item is not without its interest in estimating the measure of muscular force in animals; since, probably, few stronger instances of its intensity could be adduced. And Leeuwenhoek has demonstrated the muscular fibres of the ox to exceed those of the flea in diameter by four times only.‡ The earliest authentic biological observation that we possess, touching the group, is to be found, like so many others, in the pages of the great Stagyrite. Aristotle knew the progeny of the flea to be a maggot,§ but not having followed out its history, he attributed to the insect a sort of "equivocal generation," such as continued to be a common and

---

* ψύλλαν ὁπόσους ἄλλοιτο τῆς αυτῆς πόδας Aristophanis Nubes act. 1, sc. 2.

† Kirby and Spence, Introduction to Entomology, vol. 2, p. 315; Latreille Hist. Nat. des Insectes Tome 2. p. 410.

‡ Opera, Tom. 4, Epist. Phys. 37. A.D. 1719.

§ Σκώληκας γεννῶσι, Aristoteles de Generatione animalium l. 1, c. 16.

favourite explanation, in cases of imperfect and difficult observation, so long as the improvement of optical appliances, and the growing inductions of experience had not prepared the way for Harvey's proverb, "Omnia ex ovo." The invention of the microscope opened, as it were, a new world to man's contemplation, and revealed the secret inscription, "Deus maximus in minimis." Creatures which escape our senses by their minuteness, or provoke our disgust by their appearance or habits, are yet as points and letters in the page of nature, traced by the finger of its Maker there. And man, who is but dust, and returns to dust, may learn a lesson from the study of the dust itself that cleaves to the sole of his foot. The ingenious Hooke, in his Micrographia, A.D. 1667, gave the first good figure of the flea, which long continued to be copied into dictionaries and text-books, as the best extant. He observed "the quick, round black eye, and the cavity behind it, in which seems to move to and fro a certain thin film, beset with many small transparent hairs,"* which he suspected might be the ear; an opinion not discarded for many years after. The celebrated Leeuwenhock first solved the problem bequeathed by Aristotle, and proved that the flea undergoes a metamorphosis,† even as the butterfly, whose wonderful history has long afforded a text to the poet and the theologian. But his brief indication of the fact was first fully illustrated by a communication to the Royal Society of London of the observations of Dr. Jacinto Cestoni, of Florence, accompanied with figures of the different stages of the flea's development.‡ These observations leave little to be desired, accurately determining many points which at a very recent period have continued to be the subject of debate, or have been given as novel facts. The figure of the larva, after Cestoni's drawing, though tolerably faithful in the main, gave exaggerated length to the antennæ and the anal hooks. The proportions of these were better expressed by Roesel,§ although he fell into some trifling errors (which we may have to notice again), in consequence, probably, of the imperfect defining power of the microscope, the excellence of which his editor, Kleemann, takes occasion to commend on the ground of some of those very errors. Frisch, Degeer, and others, also observed the transformations of the flea, and Degeer distinguished a changeable soft protuberance on the underside of the head of the larva, as to which we are not even yet quite clear.‖ Up to this period, although the structure of the mouth in its outward complex form had been pretty well represented, its real composition was little understood, and the projecting four-jointed manillary palpi were commonly taken for antennæ, in the absence of any other organs to represent these in the usual place. Lutreille, with clear judgment and characteristic modesty, *suggested* the true relations of the parts,¶ which Savigny** fully verified twenty years afterwards by those careful dissections, which established on a sure basis the important principle of the homology of the parts of the mouth in all insects, first suggested by Illiger,†† embraced by the most philosophical entomologists of later times, and well set forth in its extended application to the whole of the Annulata‡‡ by Erichson, lately snatched away from us—alas! too soon for the cause of science and sound criticism. The supposed antennæ being proved to belong to the mouth, it remained to confirm Latreille's opinion of the presence of antennæ in the problematical organs behind the eye; and this task was satisfactorily performed by Curtis, who first demonstrated the labial palpi existing in the

---

* Micrographia, p. 210.
† Opera Tom. 1, Epist. 10. A.D. 1687.—Tom. 4. Epist. Phys. 37. A.D. 1719.
‡ Philosophical Transactions A.D. 1699. p. 42, 43.
§ Insekten Belustigungen Bd. 2. Muecken u. s. w. Taf. 2, fig. 7
‖ Memoires etc. Tome 7, ch. 1, pl. 1, fig 4.
¶ Histoire Naturelle des Insectes Tome 2, p. 335.—Tome 14, p. 405.
** Memoires sur les Animaux sans vertebres i. 27.
†† Kaefer Preussens, Vorrede xxi. 9.
‡‡ Ueber Zoologische charactere der Insekten u. s. w.

articulated sheath of the sucker seen by former observers,* and afterwards the varied forms and distinct articulation of the antennæ.† Dugés' observations, published a little later, corroborated and enlarged these data, although he fell into some errors, less of observation than of judgment.‡ Among these I should be disposed to reckon (if I may without presumption) the opinion first started by MacLeay,§ and countenanced by Kirby and Spence,‖ that there are rudiments of wings, and a corresponding segmentation of the thorax, in the flea. I am disposed rather to assent to Strauss Durckheim's remark, that the structure of the thoracic segments proves the abortion of wings to be normally complete, and not merely exceptional.¶ At a later period, Dugés corrected the most glaring error of his former anatomical description, and adduced grounds for modifying the interpretation of the central lancet, commonly qualified as a tongue.** He gave, at the same time, a valuable contribution to the general characteristic of the group, by demonstrating the analogous composition of the mouth of the Chegoe, with the significant difference of the abortion of the second pair of palpi. Other writers have contributed to the knowledge of this peculiar form in the group, which I myself have had but limited opportunity of studying. More lately, Westwood has figured the larva of Pulex, and demonstrated the mandibles,†† less exactly shown before in Roesel's figures. Last of all, Lacaze-Duthiers has examined the segmentation of the abdomen in these insects, as a distinct order, and has compared it with that of the other orders.‡‡

Turning from the anatomical and physiological data to the systematical relations deduced from them, we find Pulex ranked among the Aptera by Linnæus, who adopted and developed the alary system that Aristotle had sketched out. Roesel, excluding apterous insects from the scope of his book, has yet illustrated the history of the flea, as a section of the Diptera, to which order he concludes that it is most nearly allied by metamorphosis and oral organization.§§ The very general adoption of this view by the German school of late vouches for the insight into deeper analogies, which the old artist had caught in this instance.‖‖ Degeer was the first who, shaping out what has been called an "eclectic system," from the combined consideration of the gradual development and the final type of organization, constituted a peculiar order (Suctoria) for Pulex and its affinities. While Fabricius, who also perceived the incongruity of the Linnean conglomeration of apterous insects, united Pulex with his Rhyngota (Hemiptera), disregarding wholly the significance of the metamorphosis, and misinterpreting the composition of the mouth, in accordance with the common opinion of the time.¶¶ Illiger, who threw out the first hint of the oral homology, which has fructified and wrought a revolution in the whole system,

---

* British Entomology 114. A.D. 1826; and Kirby and Spence's Introduction vol. 3, pl. 7, fig. 8.

† British Entomology 417. August, 1832.

‡ Annales des Sciences Naturelles, Zoologie Ser. 1. Tome 27. A.D. 1832, 1833.

§ Horae Entomologicæ 1, p. 357.

‖ Introduction to Entomology vol. 4, p. 383.

¶ Considerations generales sur l'Anatomie comparèe des animaux articulès etc., p. 9, 10.

** Annales des Sc. Nat. Zool. Ser. 2. Tome 6. A.D. 1836, 1837.

†† Gardener's Chronicle A.D. 1848.

‡‡ Annales des Sc. Nat. Zool. Serie 3. Tome 19, A.D. 1853.

§§ Insekten Belust. Bd. 2. Muecken u. s. w., p. 10.

‖‖ I have not noticed, as scientific guesses, either the aphorism which Roesel quotes from a learned ancient, Athanasius Kircher, that the flea is a wingless cricket, not having been able to find the passage with its context in the Musurgia; nor yet the jester Wolcott's pseudonymous report of another eminent man's sentence, "fleas are *not* lobsters," the phrase being unnecessarily emphasized, and the evidence apocryphal.

¶¶ Systema Entomologiæ. A.D. 1775.

did not, however, discern its specific application in this instance, and followed Fabricius, as his master, in the definition of the Hemiptera. Latreille, to whom the honour is usually assigned of being the founder, as he was certainly the most influential advocate of the "eclectic" method, accepted the order Ductoria; but in his successive works he varied repeatedly the position assigned to it in relation to the other orders—betraying sufficiently, in those numerous transpositions, the want of one great leading principle of arrangement, such as is embodied in the several systems of dominant organs, whether alary, cibarian, or tarsal, with all their attendant defects, or in the physiological method, that subordinates them all to the plan of animal development, which had been regarded primarily by Swammerdam and Ray. Oken was the first who seized as a scientific fact Roesel's not unscientific accommodation, and consigned the flea to the order Diptera,* a conclusion which the able physiologist Strauss Durckheim has attested, with almost epigrammatic brevity, in the sentence, "fleas may be considered as dipterous insects without wings."† Oken's study of nature was too extended for us to cite him as an entomologist in particular. The transcendental scheme which rose to his view, sitting at the feet of Schelling, had itself to undergo no slight metamorphosis before it was matured into the present physiological—as its disciples call it, philosophical—or, as others speak, German school of natural history. But that particular conclusion has been accepted by the most eminent names among his successors—Burmeister, Siebold, Erichson, Schioedte—down to the present time. Lamarck, again, retaining the order Aptera for these insects, declared their closest affinity to the Diptera. Most of the French and English entomologists dispose of them as a distinct order, intermediate between the Diptera and Hemiptera. MacLeay, in the ingenious volumes which ushered his quinary system into the world, has so placed them, also; but has derived, out of the conditions of the circular arrangement, another relation of analogy to the Coleoptera.‡ Leach introduced them between the Hemiptera and Lepidoptera, a position coinciding with one of Latreille's changeful arrangements.§ Dugès, on the other hand, with the advantage of a more thorough study of their organization, admits the comparison with the orders Diptera and Hymenoptera alone.‖ As a distinct order, they have been treated by all the modern English school, (reproached by the philosophical naturalists of Germany with a propensity to multiply divisions),¶ until Newman came forward to advocate, as these have done, their subordination to the type of Diptera.** This view, again combated by Westwood,†† has been adopted, in the only text-book of British Diptera that we possess.‡‡

The writer of this notice, having occasion to consider these conflicting opinions, found a lack of information on various points of the organization of Pulex which might bear upon the question, and was led, in consequence,

---

* Naturgeschichte für Schulen. A.D. 1821.

† Anat. Comp. des An. s. vert. p. 10.

‡ Horae Entomologicae l.l.

§ Annales du Museum. A.D. 1821.—Leach, article Entomology in the Edinburgh Encyclopaedia.

‖ Annales des Sc. Nat. 16.—Cours de Zoologie.

¶ Burmeister, Manual of Entomology vol. 2, p. 407. "Haliday * * * after the fashion of his compatriots, who seem to consider the multiplication of subdivisions as the highest aim of descriptive Zoology, has made of the Linnean genus Thrips a new order, which he calls Thysanoptera, etc." I am now quite disposed to acquiesce in Burmeister's sentence, as regards the particular case, and do not feel called on to protest against the sweeping generality of his obiter dictum.

** Zoologist A.D. 1851, App. cxliii.

†† Proceedings of the Entomological Society of London for 1852. p. 162.

‡‡ Insecta Britannica, the Diperta, by F. Walker, F.L.S. 3 vols. 1851, '52, '55.

to make some further examination, with a view to supply the deficiency. Not being likely to have leisure to resume the inquiry more systematically, it has been thought it might be as well to put on record the additional data obtained, however imperfectly elucidated, for the assistance of others, until some competent anatomist may condescend to turn his attention to this neglected subject. For the materials of this investigation he has been chiefly indebted to Mr. Westwood; and not less, for bibliographical information, to his Modern Classification of Insects—a storehouse of entomological knowledge, which nearly dispenses with the private labour of such research up to the time of its publication.

In entering on this inquiry, the following parts of the subject were considered to be so well established as to require no particular investigation. The history of the metamorphosis, the external form, and the oral organs in general of the larva, as well as of the perfect insect, the structure of the antennæ and legs, and the segmentation of the abdomen. As points contested or imperfectly determined, there remained the exact composition of the labial palpi, and the analogical significance of the middle lancet of the sucker and of the lateral plates of the mesothorax and metathorax. No information, except that already quoted from Leeuwenhoek, was found extant as to the internal anatomy of either larva or perfect insect, or the outlets of the respiratory system.

In *Pulex canis* the labial palpi were observed distinctly 4-jointed, and the membranous edge, figured by Curtis and Dugés, by no means obvious, although the parallel direction and close contiguity of these palpi gives them the appearance of a simply articulated sheath, and suggests a tendency towards their coalescence in such a shape, which indication, however, the abortion of the palpi in *Sarcopsylla* may be considered to neutralize. Dugés' observations, coupled with the general analogy of the antecedent and superior development of the *labrum* in insects, seem to fix this character on the middle lancet, although Grube, from the result of Gerstfeldt's recent observations, has again treated it as a tongue or epipharynx.* The spiracles were found without difficulty in the perfect insect, although they have been passed over without notice in general, and their absence even assumed by implication. In the abdomen they are segmentary, and placed in the upper half ring of each of the first six complete segments, in the anterior horny portion, a little in advance of and above the lower termination of the comb, or row of bristles, and rather concealed by the overlapping of the thinner edge of the preceding segment. They are of moderate size, embraced by a circular horny ring of a dark colour, and the tracheæ which arise from them can be seen through the transparent shield so plainly that both its spiral fibre and two stout trunks springing from it in opposite directions, at a little distance from the spiracle, are evident.† The first dorsal half ring, which wants a corresponding ventral piece, in consequence of the lateral prolongation of the metathorax, is also destitute of a spiracle; but close under the sides of it, near the upper margin of the lateral lobe of the metathorax, is a similar one. The spiracles of the remaining pair differ in being closed externally by an annularly striated membranous cone, projecting from within the horny ring.‡ The spiracle is placed in the lowest part of the mesothoracic pleura, immediately above the hinder angle of the base of the intermediate coxa, and in a nearly membranous and thus apparently intersegmentary space. Between the prothorax and mesothorax no spiracle was detected, although the examination may not have been sufficient to negative positively the presence of such. The squameous enlargements of the pleuræ of the metathorax, which have been considered as the rudiments of wings, have quite the character of the rest of the integuments, and are similarly furnished with bristles disposed in two additional rows, nearly continuous with the two upon the small dorsal half ring, which has been considered

---

* Wiegmann's Archiv für Naturgeschichte. A.D. 1854. Bd. 1.

† Plate 1. fig. 1. The half-ring inverted.

‡ Plate 1. fig. 2. The remaining references are to Plate 4 of vol. 2.

as a scutellum, but which, with Lacaze-Duthiers, I would refer to the abdomen. The presence of a spiracle on the lateral lobes seems conclusive as to the character of these parts. The comparative freedom of the edges is probably accommodated to the play of the muscles in leaping. The lateral enlargement of the mesopleuræ is much less conspicuous, and has not nearly so much the appearance of a free process, which could be assimilated to an undeveloped wing or elytron.

The larva of the flea has been so well described already that there is little to add with regard to external form. (See Vol. II., pl. 4, fig. 3, 4.) The mandibles, first clearly demonstrated, as to their position in situ, by Mr. Westwood, work as nippers within the fleshy cavity of the mouth, and must be extracted in order to gain a clear idea of their form. They appear then wedge-shaped, but slightly incurved, ending with five minute teeth along the internal edge of the tip. (Fig. 18.) The palpi are two-jointed, the first joint very short, the second nearly cylindrical, crowned at the tip with three tubercles. (Fig. 16, 17.) The insertion of each palpus is in a fleshy protuberance, forming jointly two lobes, separated in the middle by a stricture. (Fig. 12.) Behind them there is a soft, retractile wart, characterized by Degeer as a help to progression, the place of which is marked in figure 10 by the two minute hairs. In this place I have seemed to see a pair of exceedingly minute palpus-like tubercles, which, however, were again resolved by more accurate adjustment of the microscope, so that the appearance was probably an ocular deception, such as frequently occurs about the origin of a hair. It is worth observing, however, that some unpublished drawings, which Mr. Westwood kindly communicated, represent this pretty much as I at first viewed it. The antennæ, about twice as long as the palpi, are composed of two joints, and a crowning bristle; the first joint is stout, emerging but little, and is surrounded by a ring of eight globular tubercles.* The second joint is nearly cylindrical, tapering a little, and about four times as long as the terminal bristle. (Fig. 14.) The depressed subcylindrical body is composed of twelve segments, each surrounded by a whorl of long hairs. The last segment is nearly twice as long as the preceding, and having three such whorls is consequently represented by two segments in Cestoni's figure; its posterior declivity is fringed above with finer hairs (Fig. 21, 22), and terminates below on each side with a slightly hooked horny process, which serves as a sort of foot. (Fig. 21, 23.) The integuments seem smooth and glossy, except under a high magnifying power, when a system of fine ambient striae may be detected. (Fig 19, 20.) At each side of the intermediate segments, a little before the middle, is a finely reticulated round space, adjacent to an oval spiracle. (Fig. 20, s.) Through the transparent skin a double trunk of extremely fine tracheæ (t) may be detected running longitudinally, and connected by a cross branch half way between the spiracles, to each of which a stouter branch runs directly from the upper trunk. The number and arrangement of the spiracles I did not determine quite to my satisfaction, but have set it down as probably a prothoracic pair, and a pair in each of the abdominal segments except the last, that is nine pair, or, perhaps, only eight in all. The skin of the larva is sufficiently transparent to discover the course of the intestinal canal also; the slender œsophagus, and the small crop marked out by the sanguine colour of the contents, occupying a little more than the first two segments after the head, while the stricture which marks the passage of the small intestine into the rectum lies in the penultimate segment. (Fig. 4.) The whole alimentary canal (Fig. 7) is not much longer than the body, so that the small intestine alone is convoluted. The very slender œsophagus (e) is little longer than the head; the ventricle (v), including the crop, which is not limited by any external stricture, though the different colour of the contents indicates an internal partition, is nearly half the entire length; the small intestine (t) and the rectum (r), each about half as long as this, the latter with a slight

* The eye described and figured by Roesel, close to the base of the antenna in the larva, was probably the outermost of these tubercles, relieved in outline, and exaggerated by an imperfectly defining high power of object glass.

tendency to a coecal enlargement backwards, above their junction. The four free malpighian vessels (o) are about as long as the ventricle, attenuated and doubled back in the middle. The rachidian chord (fig. 5) is composed of a larger bilobed cephalic ganglion, an infraœsophagian ganglion, closely joined to it, and nine succeeding ganglions of an oval form, the last, as usual, a little enlarged, the internodes scarcely as long as the ganglions, forming very slender threads, which, on closer examination, are found to be double. (Fig. 6.) Some other organs were observed in the full-grown larva, which may be the rudiments of the reproductive system—viz., a pair of oval vessels, on a long footstalk, and crowned by a cone apparently consisting of several filaments pressed together (one of these shown, fig. 8); and a single but complex organ, composed of an oblong hyaline vesicle, terminated by a long filament, and seated on a linear footstalk, which sends off in sucession two long linear branches, the stippled texture of which announces them to be not mere receptacles, but organs of secretion. (Fig. 9.) Neither the salivary glands nor the silk vessels of the larva were discovered.

The position of the spiracles in the perfect insect having been already specified, it remains to notice the internal changes from the structure described in the larva. The respiratory system is simply tracheal, as before, utricular development being regularly restricted to insects that fly. The alimentary canal is shortened, the small intestine being absorbed; the ventricle is more ample and its chambers better defined; the crop is now oval (c), and behind it the membrane presents the appearance of a spiral fold, forming two chambers and ending behind with a short cæcal protuberance (p). The malpighian vessels are now longer in proportion and perfectly linear. Neither in the perfect insect nor in the larva did I observe the presence (not to be doubted) of the ordinary detergent nuclei of the rectum. Figure 24 shows (at y) two delicate filaments in the neighbourhood of the crop. I do not venture to determine whether they are connecting threads between it and the salivary outlet, or mere fragments of tracheæ. Two other capitate vessels (x), shown in juxta-position to the ventricles, are probably only accidentally so seen; they may possibly be the salivary glands cut off and displaced; as I did not make out that system otherwise. My observations on the neurology of the perfect insect are very incomplete, having been made on an old dried specimen. The supra and infraœsophagian ganglions appeared to have been cut off; in which case the number of ganglions had undergone no change in the metamorphosis, as I counted nine remaining, the first two of which were somewhat enlarged; the internodes were shortened, and the connecting chords much stouter than before, and parted by an evident elliptic interval. The ovaries of the female compose each a uniserial spike of six long multilocular ovithecæ (Fig. 28, d). The only appendage of the oviduct observed is shown (at s) as an oval vessel, with granular detached patches of the membrane (indicating a function of secretion?), mounted on a short, slender, excretory duct, and ending in a slight filament with a thickened origin. Perhaps a more careful examination may discover a triplicate organ, analagous to the ordinary structure in Diptera, and foreshadowed by the aforesaid apparatus (fig. 9) of the larva. The reproductive system of the male (fig. 26) comprises a pair of large, oblong, simple, colourless capsules (g), with still longer, slender deferents (d), a pair of filiform vesicles, hooked at the tip (v, and fig. 27), and a cœcal enlargement of the utricle (g). The forked process shown, embracing this last, is probably part of the nervous system. The external grapplers are very simple, consisting of a pair of oblong, curved, horny valves, ciliated along the under edge and around the tip (fig. 25).

Now, to recapitulate the points of agreement and difference between this group and the orders to which it has been annexed or approximated; we find the metamorphosis totally unlike that of Hemiptera, from which also, in particular, the Pulicidæ differ in the not unimportant point of the pentamerous development of the tarsi; and the whole structure of the mouth, except so far as the lancet-like shape of some of the organs is in both alike subsidiary to the fluid aliment, or so far as the articulated sheath in Hemiptera may be considered to represent the palpi coalesced. The relation to the Coleoptera, suggested by

MacLeay, having been given only as a secondary one, may almost be left out of consideration, just noting, with regard to the larvæ, that the alleged agreement with that order is not so near as with the Hymenoptera, or, still more, with the Diptera; while the appearance of rudimental wings and elytra in the perfect insect seems to be merely a notion. The group having been placed, as part of the order Diptera, in the sequence adopted by Burmeister, Siebold, and Schioedte, between the Neuroptera and Lepidoptera, I may glance at the partial similitude that subsists between it and the Physapoda in the mouth—both having lancet-like enclosed mandibulæ, along with exterior palpigerous maxillæ and a palpigerous labium; but, in reality, the agreement very much depends on our arbitrary selection of particular oral characters, the difference in other points of view being considerable, and the whole organization and embryology of the two groups is very dissimilar. With the Lepidoptera it seems scarcely necessary to enter into a comparison, and Dugés has stated well enough all that he could find in favour of an affinity to the Hymenoptera. It is their relation to the Diptera which seems to demand the chief consideration; and such a relation is willingly admitted, notwithstanding some difficulties which may seem to forbid their reception into that order. The Diptera, like the Pulicidæ, have a pair of palpi attached to the base of the maxillæ, the latter consisting of a simple lobe, the basal part being analogically considered as abortive. The lancet-like condition of the upper organs of the mouth is common to both, although in Diptera there are usually two central lancets—the labrum and hypopharynx, only one of which finds a representative in the Pulicidæ.

The distinctly formed labial palpi of *Pulex* present an obvious difference; but this may not be of so great importance, if we suppose the structure and position of the palpi to indicate a tendency to coalescence, fulfilled in the geniculated sheath of the proboscis of Diptera; or if the development of the labium in the latter, at the expense of the total abortion of the palpi, be admitted, then *Sarcopsylla* presents us with this last modification already accomplished. The contiguity of the legs of each pair, and the want of terminal spurs of the tibiæ as distinguished in form from the other spines, and even the orderly distribution of spines or bristles upon the body, as well as the simple organization of the terminal segments, agree best with the Diptera. The pentamerous perfection of the tarsi is a character to which all the eminently flying orders (Anelytra) tend,* and only so far to be regarded in this view, as it is *eminently* exhibited in the Diptera.† The general character of the metamorphosis is sufficiently near to the Dipterous group in which the larvæ are peripneustic (Mycetophilidæ, Bibionidæ, Cecidomyzidæ), the single pair of jaws (mandibulæ), pair of antennæ, pair of palpi, want of eyes, of feet, along with the mode of life and progression, agreeing better with these than with any other larvæ that undergo a complete metamorphosis. This point I touch, and only touch on, because some authors, influenced by the similarity of parasitic habits, and what will perhaps be found, on closer consideration, a very imperfect analogy in the oral organs, have brought the Pulicidæ near to the Coriaceæ, the most remote point of the scale of Dipterous organization from

---

* This characteristic appears to be as perfect in the Diptera as in the Lepidoptera, although the function of flight degenerates completely in an aberrant group of the former order. Nay, in that very group there are seemingly traces of a further extreme subdivision of the joints of the legs, which may probably suggest a remote approach to the Arachnida, such as popular language has stamped with the title of "spider flies." The Pycnogonidæ in general, like the Nycteribidæ, are epizoic wanderers; but I do not venture to lay any stress on a relation of this extraneous nature.

† The few exceptions to the pentamerous character of the Diptera which have been marked (*Dicera furcata*, *Echinomyia tetraumera*, *Monodicrana terminalis*) rest on such limited, nay nearly individual observations, as urgently to call for a more general verification, and we may perhaps be allowed to hold them in suspense for the present.

that with which a comparison is here instituted, whether we regard the general form, the insertion of the legs, the segmentation of the abdomen, the embryology, the concentration of the nervous masses, or the convolutions of the elongated alimentary canal.* In regard to internal organization, the Pulicidæ agree with the Diptera, and with them alone, among the anelytrous orders, in the normal number of the malpighian vessels.† The reproductive organs show no differences to forbid the conjunction, and this is perhaps all the evidence we can look for from a system, the variations of which are correlative to the characters of minor groups or species, more obviously, than to the broad lines of demarcation between the orders. It may be observed that the triplicate system of appendages to the oviduct, so prevalent, under one or other form, in the Diptera, does not reappear, so far as has been ascertained, in the present group; but we know the same to fail in other extreme groups of Diptera. The like may be observed of the absence of the petiolated stomach or fluid-reservoir in the perfect insect, where we find only a slight tendency to cœcal appendage behind the crop. The nervous system offers a much more serious discrepancy in the bipartite internodes of the rachidian chain. The anomalous condition so singularly presented in the females alone of the family Conopidæ‡ does not seem much to lessen the weight of this argument. More important in this light is the observation of Siebold, that some of the Nemocera (*Culex*, *Chironomus*, *Simulia*, *&c.*) in the larva state have a double chord for the internodes.§

Reverting to the external organization, the main differences which I would put forward are the singular relative position of the eye and antenna, the plan of articulation between the head and thorax (the hind margin of the former in great part embracing the front of the prothorax in its full amplitude), the remarkable displacement of the fore epimera, giving to the fore-legs the appearance of being attached to the head, and the disproportionate enlargement of the metathorax which becomes the largest segment of the trunk. Among all these, perhaps the articulation between the head and thorax deserves the most serious consideration, not merely as tending to separate the Pulicidæ from the order Diptera, but as suggesting the chief difficulty which affects their position, as a distinct group, in the series of the orders. Irrespective of this, the embryology and the tarsal formula would concur to mark out for the group a place somewhere among the typically winged—*i. e.*, anelytrous orders. But, on the other hand, the complete separation and even versatile freedom of the head seems to stand in a direct relation to the general perfection of the organization for flight, even though the actual function and the immediate instruments of it should become abortive within the limits of species, genus, or even family. Still, having the concurrent data of complete metamorphosis in respect of the mouth and legs, and the acme of tarsal articulation attained in the final state, it would be going very far to nullify this compound expression of affinity because of the contrary value of a single term. So, leaving to these considerations their full weight as to place in the scale, I single out that particular of the segmentation, and the relative position of the eye and the antenna, as the strongest arguments for the independent rank that has long been so generally attributed to the Suctoria or Aphaniptera.

---

* Burmeister has placed *Pulex* at the point of divarication of a double series of Dipterous families, and thus made it a connecting link between those extreme forms; De Insectorum systemate naturali. A.D. 1829.

† *Six* is the rule in Lepidoptera. In Hymenoptera the number *varies* from two (g. *Anaphes*), up to an indefinite multitude, differing even in the species of one genus (g. *Megaspilus*, 3, 5, 7), and passing through the odd as well as even numbers, as three in *Polynema ovulorum*, *Diapria verticillata*, *Microps rubi*, *Inostemma boscii*, etc. In Diptera we uniformly find *four* malpighian vessels, with the exception of the families Culicidæ and Phlebotomidæ, which regularly have five.

‡ Memoires presentès a l'Academie de France. Tome 11, p. 185, pl. 1. fig. 8.

§ Handbuch der Vergleichenden Anatomie, 1er Theil, p. 572.

SUPPLEMENTARY NOTE.

It has occurred to me, on looking over these notes again, that the points of comparison selected, and the estimate formed of them, must be so much influenced by the view entertained as to the succession of the orders, that I should explain myself on this head. Not aspiring to originality, which, that it may rise above mere fancy, must be based on a comprehensive knowledge of every order, or spring out of that intuitive perception granted to few, I adopt the general view indicated by Germar in the article DIPTERA of the Universal Encyclopædia, by Ersch and Gruber, considering that it tends more nearly than any other to unite the alary, metamorphotic, and tarsal systems, in a nearly harmonious progression. The cibarian system alone suffers a rude shock from it; and this is of so much moment that I have chosen to represent the connection of the orders by a recurrent series or circular diagram, which can be resolved into a linear series

Pediculina. Coccina.
i. HEMIPTERA, 1.
Physapoda.
ii. NEUROPTERA, 6. vi. DIPTERA, 2.
Labidura.
iii. COLEOPTERA, 5. v. LEPIDOPTERA, 3.
Strepsiptera.
iv. HYMENOPTERA, 4.

either by the alary system, or the cibarian, according as we break the continuous circle before or after the order Hemiptera; and then a diameter produced from the intersection to the opposite circumference will represent a dichotomy of the class corresponding to each of those respectively. Such a dichotomy was a principle of the cibarian system of Fabricius, which, according to the reactive power of words, has been perpetuated by Clairville's happily chosen terms Mandibulata and Haustellata, as much, perhaps, as by the actual contrast between the systems of oral composition, and more than by any positive internal congruity as regards one of the groups. The alary system commenced with an equivalent dichotomy by Aristotle, retained by most who have adopted the broad conception of the system, and is indicated here on the grounds that Germar has specified, without attributing much importance to the division, or precision to the line of demarcation.

I am disposed to accede to the opinion rather than the arguments of Agassiz, that the most perfect development of insect organization is to be sought among the Haustellate orders, and am not prepared to dissent from his designation of the LEPIDOPTERA for the representative.* If determined, indeed, to attribute an unqualified predominance to the alary characters, some plausible arguments might be urged in favour of the COLEOPTERA, to which, separately, Oken attributed a rank co-ordinate with the two other great sections (which comprised for him the rest of the class of insects), and a grade of development superior to the rest; in which latter point only his followers in general are agreed with him. In fact, the position to be assigned to this order is, perhaps, the most difficult problem in the whole of this arrangement; the grade of metamorphosis, and the prevalence of the pentamerous type in the tarsi, raising it above the Neuroptera and Hemiptera, while the essentially heterogenous wings militate against such an intermediate place for it in a linear series. It is even difficult to designate with confidence the typical element of the order itself; the very perfect organization of the *Lamellicornia* almost outweighing the general considerations that might lead us to look for that type in the *Heteromera*. The *Neuroptera* have been a more obvious stumbling-block to systematists, from the great variation of their characters in general, and the absence of any one invariable essential mark. Hence the successive dismemberments, *Orthoptera*,

* The classification of insects from embryological data; vol. 2 of Smithsonian contributions to knowledge. A.D. 1851.

Trichoptera, *Dermaptera*, *Dictyotoptera*, *Thysanoptera* (not to mention the *Mallophaga* and *Thysanura*), which, if inadmissible permanently, have, perhaps, served a purpose in exciting to more accurate investigation and comparison of the distinctive characters, which has ended in a result the very opposite of that contemplated—that is, in their incorporation again in one order. The greatest apparent difficulty arising out of this re-union, in connection with the place determined for the order by the character of its chief component groups, lies in the removal of the *Plicipennia* to such a distance from the Lepidoptera—a position which is represented in the circular arrangement by opposite points of the circle. Shall we, then, have to betake ourselves to the notion of an ideal recurrent, or a double parallel series, with representative analogies between opposite points ?

After some conversation which followed the reading of this paper, Mr. E. Percival Wright read the following communication from Edward Waller, Esq., Corresponding Member,

ON THE OCCURRENCE IN FINNOE OF SOME RARE FRESH-WATER MOLLUSCA.

Since my list of the land and fresh-water mollusca found at Finnoe was sent to the Association, I have discovered a few other species, which, from their rare *occurrence in Ireland*, may be worth noting.

Succinea Oblonga.—(Drap.)—In August last I visited a piece of low ground where I had formerly collected Succinea Pfeifferi in great abundance, and of a form which Mr. Thompson considered typical. I did not then discover any other species of Succinea. On my last visit, Succinea Pfeifferi had become rare; but amongst them, in various spots, I found a good many of the Succinea Oblonga, agreeing very well with the description and figure in Gray's Turton. This species was not given in Mr. Thompson's list of Irish shells.—(Ann. and Mag. Nat. Hist., Sept., 1840.) Forbes and Hanley give localities in the extreme south of Ireland. It must still be considered a rare shell in Ireland, and it seems to be very local in England.

Vertigo Substriata.—Under stones in a wood, on high ground, at Finnoe, I found a good many of this species. I could not discover it beyond a very limited space.

Helix Aculeata.—I obtained an individual of this species at Prior Park, which, although not strictly within the limits by which the small district of Finnoe was defined, is not more than a mile from it. The shell was found under a small stone, part of a heap beneath beech trees. Several careful examinations of the ground in the immediate vicinity did not reward me with another specimen.

Anodon Cygneus—Procured at Prior Park, from a small deep lake, out of which a very small *stream flows to the Shannon.*

There are thus four species added to the list of Finnoe shells. The Succinea Oblonga rarely exceed three lines in length. In Gray's Turton this shell is said to be like Limneus Fossarius in shape. This may be true in a front view; but, looking at the outer lip in profile, any one at all acquainted with the general shape of Limneus will see the difference. The folding of the inner lip is a generic distinction easily observed. It may have been mistaken and passed over by inexperienced collectors, but may be readily distinguished by a little attention. On comparing some of these shells with specimens of Succinea Angustior, of Adams, sent by Mr. Chitty from Jamaica, to the Royal Dublin Society, there did not appear to me any difference on which to found a distinct species. I send a couple of specimens for the University Museum, which may not possess Irish ones. It would be desirable to have a comparison of the Succinea Angustior with the British Oblonga made by competent judges.

The Helix Aculeata being a shell rarely met with, it may be useful to state the localities in which I have found it, and where, so far as I know, it has not been heretofore noticed. About two miles below Mallow, on limestone rocks, on the borders of the valley of the Blackwater, I found two dead specimens together, under moss, with which the rock was covered. In an hour's search I could not discover another. Many years since, in a beech wood, not far from the Cumberland Cave, near Matlock, in Derbyshire, I obtained a single specimen among

the fallen leaves. I failed in obtaining another. These distant localities were all in limestone districts, and near trees, principally beech.

At Finnoe there occurred to me another Pupa Umbilicata, with a second tooth. The second tooth in these shells is about the same distance from the pillar lip which the ordinary one is from the outer lip. The additional tooth is much smaller than the normal one, a little within the margin, not forming a continued line with the outer margin, as the opposite one does. This seems to me but a variety of Pupa Umbilicata, which I have found very variable. It is not in the least like the figure of Pupa Bidentata in Brown's British Land and Fresh-water Conchology.

Mr. Haliday also presented the detailed descriptions of two Coleopterous larvæ, shown at a previous meeting.

1. Ochthebuis punctatus. Vol. III. Pl. 3. Fig. 3.

The oblong rather depressed larva, about a line in length, is found, in company with the perfect insect, on the mud of dried-up pools of brackish water, under the film of green matter, on which it probably feeds It is shining pitchy black, with some pale hairs thinly scattered on the head and limbs, and disposed in a whorl along an impressed line surrounding the hind margin of each abdominal segment. The thoracic segments have a row of finer hairs before the hind margin. The head is semi-circular, nearly as broad as the thorax, not narrowed to a neck, the mouth projecting downwards, the labrum large, almost as long as broad, the anterior margin sinuated, with the middle lobe most advanced. The mandibles reddish brown, very stout at the base, and the inner edge there furnished with a convex grinding surface (molar), the slender tip is gently curved, and its inner edge cut into six minute teeth. One mandible has also another internal tooth beyond the molar. The maxillæ are rather slender, the lobe longer than the shaft, slightly curved and ciliated along the inner edge towards the acute point. The three-jointed palpi rather exceed the lobe, the second joint is rather shorter than the others, the last pointed. The labrum is about twice as long as broad, the ligula being very little exserted, slightly bilobed and faintly ciliated. The very minute palpi consist of two joints, besides the very short scape, the second being the smallest. There are two ocelli at each side of the head, behind the antennæ. The antennæ are shorter than the breadth of the head, composed of two stout basal joints, ferruginous, linear, another joint longer than those two together, and a minute obconic fourth joint, crowned by a papilla, encircled by a few hairs. The prothorax somewhat broader behind, with the sides and basal angles rounded, longer than the following two segments, which again exceed those of the abdomen. This tapers only towards the tip, and the last segment ends in two styles as long as itself, crowned by a two-jointed shorter process, with the second joint exceedingly slender, ending in a few long hairs. The legs are about as long at the breadth of the body, with stout coxa, trochanter very short, femur nearly linear, tibia tapering towards the end, tarsus a simple slender claw, not half as long as the tibia.

2. Diglossa mersa. Vol. II. Pl. 3. Fig. 4.

The larva found in July and August, along with the perfect insect, under stones on the sea coast, near Dublin, and also at Ferriter's Cove and Carragh Creek in Kerry, is rather more than a line long, of a dull creamy white, usually appearing marked with a longitudinal dark line, the translucent contents of the intestine. The head is horny and pale testaceous, but the thoracic segments show little trace of any horny shield. The head is rounded and broader than the thorax, the rest of the body nearly linear, only beginning to taper towards the tip of the abdomen; the tubular segment with which it ends is armed with a stout bristle at each side, towards the end, but wants the terminal styles so prevalent in Staphylinidous larvæ. The head, body, and legs, are sparingly beset with hairs, extending to the area of the eyes. The antennæ, scarcely as long as the head is broad, are composed of three joints, the third, more slender and as long as the two preceding together, ends in a lateral papilla, preceded by a minute spine. The mouth is prominent; the labrum short, transverse, entire, finely edged with a denticulated membrane; the mandibles long, tapering to a gently

incurved point, and armed with a minute tooth of the inner edge, a little way before the end. The maxillæ are also long, and the shaft and lobe of nearly equal length, so that the palpus is inserted rather before the middle; it is shorter than the lobe, three-jointed, the first joint, largest clavate, the second shortest, the third tapering to a point. The inner edge of the lobe is armed with a bristle, beyond the middle, and very delicately ciliated from this to the end. The labrum, nearly as long as the maxillæ, has the oblong mentum a little contracted towards the base, the slender ligula tapering to a point, from the sides of which, about the middle, arise two short processes, as the scapes of the palpi, which consist of two joints more, the last pointed; no paraglossæ. The prothorax is larger than the following thoracic segments, and these somewhat longer than the abdominal. The legs are rather long, the hind pair fully one-fourth of the length of the body, the coxa broad, about two-thirds the length of the femur; the trochanter exerted, the femur and tibia clavate, and about equal in length, but the latter more slender, and the fore tibia has, before the tip outside, a slender spine, distinguished from the finer scattered hairs; the tarsus not half as long as the tibia, three-jointed, the last joint a pointed claw, and the articulations marked by the insertion of hairs.

The figure, being made from a specimen long kept in spirits, shows the form too slender.

The meeting then separated to the 21st December next.

FRIDAY, DECEMBER 21, 1856.

A. H. Haliday, A.M., V.P., in the chair.

The following donations to the library were acknowledged:—"Natural History Review," vol. ii., from the Editors; "Monograph on the British Phalangidæ," by R. H. Meade, Esq., from the author; "On the Dying Properties of Lichens," by Wm. Lyndsay, Esq., from E. Percival Wright, Esq.

A vote of thanks having been passed to the donors, Dr. Lamprey read the following paper—

ON THE OVA OF HYLUS.

On looking over the printed transactions of this Association I find a letter I addressed to my brother, then your secretary, dated Kandy, 9th October, 1854, of which the following is an extract:—

"I will endeavour to send you a variety of the ova, which I found attached to the walls of a garden well; but the animal producing it is aquatic, and the substance, though four times the size, is slimy, and, I fear, too bulky to send by post. I found masses on the leaves and stems of the trees overhanging the water, as well as on the wall of the well. I have sent my boy out for a specimen. The variety I first described is not very common, and but occasionally met with."

Having, since that letter was written, in searching after the origin of the substance alluded to, ascertained some important facts in the natural history of frogs, I take this opportunity of referring to my former communication. Being anxious to ascertain all about this substance, I went to the well, situated in the governor's garden at Kandy, where I found my first specimen, and carefully examined the portion of the numerous other masses that still remained. I noticed that on the inner side of the wall of the well there were several much larger masses, some of which touched the water, but all of them were of a soft, slimy consistency, and of an opaque white and green colour. On looking at the branches and leaves of the two trees that overshadowed the well—a mango and kino tree—I was much struck by observing the great quantity of masses of this substance situated high up on the leaves and branches, and observed that all were placed in such a position with reference to the well, that if they fell they would all fall into the water. Having secured one of these masses attached to the side of the well, I opened it, and found it to contain a large quantity of the ova of some animal. They were small, whitish, globular bodies, having a central germinal spot of a dark colour, and were about the size of a duck shot. I also noticed the larva of the common Muscidæ. Having selected a small compact specimen attached to the stem of the kino tree, I brought it home and

placed it to dry, by hanging it on a nail in the wall of my room. It appeared for some days to be drying very favourably, when I was much startled one day by observing no small commotion among the ants on the floor underneath it; and, on looking close, I noticed a number of little creatures jumping about, and in great distress, showing evidently that they were not in their proper element; so, having placed a tumbler of water, and arranging it in such a manner that they might fall into it, as they escaped from the mass, I was soon gratified by observing the little creatures swimming about most comfortably.

On examining the substance they fell out of, I noticed that all the surface externally was dry and perfect except the part immediately in contact with the wall, where there was a hole through which the little creatures made their way. I had this specimen carefully preserved, hoping to bring it to the Society; but, unfortunately, being soon after attacked with severe illness, this, along with many other interesting specimens illustrative of the zoology of Ceylon, was lost.

I was uncertain at first what to call the little creatures that I had thus rescued from destruction, though they presented all the characters of tadpoles; the idea of frogs spawning in the trees being quite beyond my expectation. I was further somewhat embarrassed on remarking that those progressive changes which physiologists have taught us to expect in the course of the existence of those animals, previous to their complete development, occurred with a rapidity quite beyond what we notice in this country; for instance, instead of existing for some days as fishes—*i.e.*, making use of their branchiæ to aerate their blood, they, though amply provided with branchiæ, soon left them aside; for, after two or three days, I could detect no traces of branchiæ; and, the day after they were put into the water, I observed them taking in air from the surface.

It has since struck me that possibly the water, which, in this instance, was mixed with decayed and putrid matter from the mass above it, was not sufficiently oxygenated, and that, had it been fresh clean water, in all probability the branchiæ would have continued in use for several days.

I kept them under observation for five weeks; and, before leaving Kandy, I had the satisfaction of seeing the good condition of my little family of tadpoles. Their arms and legs were just beginning to sprout, and, had I had the opportunity of a few weeks further observation, I have no doubt but that, on some morning, I would have found them jumping about my house, and, perhaps, seeing them on the walls or ceiling, have mistaken them for Ghekos or house lizards. Of course, it was not possible to determine, from the imperfectly-developed animal, to what particular species or variety they belonged; but I have no doubt, from the fact of finding the masses of spawn so high up in the trees as seven or eight feet from the surface of the water, that they were deposited there by some Hylus, or tree frog, which are abundant in Ceylon.

Dr. Kelaart, in his list of Ceylon reptiles, mentions five species, and possibly there are many more:—

Fam, *Hylidæ*, *Tree Frogs.*

1. Polypedates Leucomystax, the common Tree Frog.
2. Polypedates cruciger, cross-backed do.
3. Polypedates Stellula nobis, white-spotted do.
4. Lemnodytes mutabilis nobis, changeable.
5. Lemnodytes maculata nobis, brown spotted.

The first time I had an opportunity of observing these frogs occurred in Newera Ellia last year. When walking in the jungle, I started one near the stump of an old tree; and, before I could seize hold of it, it jumped into a thorn bush, and, passing from branch to branch with wonderful rapidity, it was soon out of sight. I was greatly struck with the beautiful markings of this frog; it was of a rich brown colour, with bright yellow markings; its eye was peculiarly beautiful.

I have a specimen of Hylus by me, which I picked off the leaf of a coffee tree growing close to my house in Kandy. It was in the daytime, when these creatures always remain quiet; it is in the evening that they assume their activity; and among the sounds heard in the jungle at night, the sharp and constant click of the Hylus is none of the least remarkable; this specimen was of a tawny colour,

without any markings. You may observe the disk-like, expanded form of its toes, which distinguishes this family from the ordinary frogs and toads. On seizing this creature I was struck with the great tenacity of its grasp, owing to the adhesive surface of its toes; it is thus able to creep up a wall, or jump from branch to branch. Their legs also, being remarkably long and muscular, are admirably adapted for jumping great distances.

In conclusion, I may state, in reference to this interesting fact of the Hylus's mode of spawning in trees, that it affords a third form in which we see the Batrachia deposit their ova, and is not less remarkable than that adopted by the Surinam toad, which, you may remember, carries its young like so many balani on its back, till sufficiently matured to maintain an independent existence. In Ceylon such a provision is absolutely necessary to protect the ova from the depredations of snakes and other animals; whereas in this country the ordinary method of spawning, with which we are familiar, is sufficient for all purposes of protection.

LARVÆ INFESTING THE HORNS OF OREAS CANNA, ETC.

Mr. Haliday made some remarks on two pair of antelope's horns exhibited to the meeting, by J. M. Neligan, M.D.; these horns belonging, one pair to *Oreas Canna* (Pl. 1., Fig. 3), the other to *Kolus ellipsiprymnus*, were brought home from the Gambia about five months previously by J. Fitzgibbon, Esq., M.D., who lately purchased them from some natives in the market at Macarthy's Island, being struck by their appearance, as they were perforated by grubs enclosed in cases which projected abundantly from the surface of the horns, although these were taken from freshly killed animals, the blood not having dried up on them when brought to market. The cases were cylindrical, and closed at the outer end like the finger of a glove; extremely tough, and composed of a dark, brown felt, evidently the comminuted fibres of the horn. The largest were about two inches in length. Dr. Neligan had examined them when first received in Dublin, and found they contained larvæ, then plump and fresh; but when Mr. Haliday first saw them they were shrivelled up, and the interior of the body so clotted that maceration failed to recover any trace of the vessels. Most of these larvæ were found with the head outwards, indicating, probably, that they had arrived at their full growth, and had then turned round preparatory to the final transformation. The largest after being steeped were nearly an inch long (Fig. 4. natural size, 5 magnified side view); the body of a pale colour, without distinguishable markings, the head, the terminal segment, the legs, the ring of the prothoracic spiracles, and the hooklets of the prolegs dark chesnut, tending to black on the head (Fig. 13, the head from above; 14, the same from beneath). The antennæ (Fig. 20) scarcely as long as the mandibulæ; three-jointed, tapering, the second joint longest, with a paler ring at its base and tip, the terminal joint exceedingly minute. The mandibles very strong, the end truncated and denticulated (Fig. 15, a mandible from outside, and also from within). The labrum sinnate emarginated (Fig. 16). The maxillæ with a double lobe, the outer lobe armed at the end with three slender spines, and some fine hairs (Fig. 17, maxillæ and labrum in position; 19, end of maxilla, with palpus), the conical four-jointed palpus shorter than the lobe. The compressed bilobed labium, armed at the base with a spine pointing backwards and upwards, the lobes finely ciliated (Fig. 18); the legs short (Fig. 8); the prolegs four pair, on the third—sixth abdominal segments, the hamuli on each between forty-five and fifty in number (Fig. 9); the last segment without prolegs, but the under plate emarginate (Fig. 10, last segment from above; 11 ditto, side view; 12 ditto, from beneath). The abdominal spiracles were not to be detected in the skin cleaned and stretched (Fig. 6); (Fig. 7, the prothoracic spiracle).

The habits of this larva made it probable that it belonged to some of the Tineidæ, nor was there anything observed in its structure inconsistent with this; the most remarkable point was the evidence that the horns had been thus infested, while the animal was yet living which bore them.

Dr. Neligan called attention to the circumstance that in each pair it was the left horn chiefly that was attacked. The President showed some horns of the Gayal, from the University Museum, more extensively and indiscriminately perforated by a similar larva, as appeared from the remains of the cases about the apertures.

OCCURRENCE OF THE BRIDLED GUILLEMOT (URIA LACRYMANS) IN IRELAND.

Dr. Carte exhibited some specimens of the Bridled Guillemot (Uria lacrymans), taken by Fred. Burton, Esq., of the Co. Clare, and also a specimen of the egg of this species taken from a nest off which the bird had been frightened.

Yarrell mentions it as a rare bird, and has some doubts as to its title to rank as a distinct species. In all these specimens the semicircle around the eye was very well marked, and was present in every specimen. It did not appear to be rare on the Clare coast, as Mr. Burton had seen many specimens, and had taken several of the eggs. He believed it was the first time that an Irish specimen of this egg had been received, and he felt much pleasure in laying the matter before the Association. The egg was somewhat distinct from the common Guillemot, the markings being more regular; but in size, after the most careful measurement, he could detect no appreciable difference, and would not therefore lay much stress on that point. He hoped in the course of next spring to be able to exhibit a series of them to the members. All the specimens exhibited were from the Museum of the Royal Dublin Society.

After which Mr. E. Percival Wright read the following—

LETTER FROM DR. KINAHAN, DATED CALLAO, AUGUST, 1855.

"I did not do much in the way of collecting on my passage out—a few Acalephæ, &c., were obtained. When in lat. 40° south., and long. 39° east, after a heavy gale, a chimney swallow flew on board, and was captured. Near Australia I obtained specimens of the green-billed Albatross; of Wilson's petrel—which species took the place of the storm petrel, as we approached the south; and of some Cape pigeons. These, with some Crustacea found attached to fish, and, on getting near land, a few insects, completes my 'Ship Fauna.'

"I could not do much in Melbourne. It was nearly impossible to get men to go out dredging, they were all so busy money-making. However, I did not regret this, as Dr. Harvey has, with more means at his disposal than I had, investigated this locality. On the shore I got specimens of one or two species of Trochus, some beautiful Phasianella, and several species of Fusus, Buccinum, and Patella, Chitons, &c., &c.

"There are very large beds of semi-fossilized shells all along this coast; and it would appear as if the sea had several times submerged and retreated from it. Many of these deposits are now undergoing the process of being denuded; so that I met with specimens of shells in a semi-fossilized state, mixed with more recent species.

"From Picnic Point to Sandridge, and thence to the Yarra, the coast is of this description; next succeed a range of low sand-hills, made up of drifting sand and the debris of shells, and covered with 'tea tree scrub and Epacris.' In other places I found cliffs of stiff clay, running nearly out into the sea, and having generally at their base reefs of sandstone; those nearest the water's edge being covered with Chitons, Patellae, Phasianella, &c. These are the only localities in which I have found any of the Echinoderms. About six miles from Melbourne I came across a section of the upraised beeches already referred to. It is about eight feet high, the top composed of blowing sand, in which were growing quantities of the tea tree scrub; next a layer, about a foot in thickness, of broken shells, chiefly 'Mytili' and 'Haliotides;' below this, coarse sand and shingle, with stumps of, I think, the tea tree (a prior generation to the one now flourishing on the top of the sand-hill). About three feet below this there is a bed of stiff clay, with perfect specimens of bivalves imbedded in it; species which, after diligent search, are not to be found in the recent state about here. So far for my success in the shell line; and you will perceive that all the species I have obtained are (owing to my being unable to dredge) essentially of the 'Littoral zone.' From the 'oyster beds' I added to my stock a few Terebratulae, and other deep sea species.

"Of Crustacea, I have met with several species. One very like our Portumnus arcuatus is found hid under stones on the reefs. Also, a species of Araneus and Pilumnus, one, of whose identity I am uncertain, has occurred to me several times, buried in small holes in the sand, under water, and frequenting, in large numbers, the cockle beds, which are grassy slobs, somewhat like the shore near the ladies' bathing-place at Sandycove. Another species I meet with under dry stones, that

is very difficult to capture; in fact, is the most active crab I have ever met with. Along with it I met another species, which buries itself all but its mouth and claws in the sand, and most gallantly shows fight at the slightest approach. There is also a very curious Pinnotheres common. I have been more successful in the Crustacea than any other family, and hope to have some novelties to exhibit to members on my return homewards. I got several species of Echinoderms, and one that I am almost sure is identical with our Irish Echinus lividus—an extensive geographic range for a 'sea urchin.' The sponges are in great abundance, and I have already some thirty species collected of this most lovely family. You know they are not in my line, but their beauty compelled me to gather them, and add them to my stores. It was not a good season of the year to collect reptiles or insects; a few butterflies and moths, some two or three dozen coleoptera, with a few ants and spiders, are all that has fallen to my lot in this line. When I reach my final destination, Callao, you shall hear from me again, when I shall write in full all that happens to me on my voyage. I send specimens of several of the shells collected here, but not any of my good specimens, as I did not like risking them to the uncertainty of the waves and winds that roll and roar between this and Ireland.

"Having found the great difficulty of writing when on shore, I think it prudent to begin this epistle where I happen to be at this present moment; but must premise, that if you find my writing more than ordinarily illegible, you must recollect that I write in my cabin; and that, owing to a heavy gale, which has lasted now for upwards of forty-eight hours, the ships rides with close-reefed topsails. I have just spent some pleasant hours in assorting my collection of Australian mollusca. The majority of the shells I took with the animals in them, but some of them are semi fossil. While telling you in my former note of the curious sections of the coast which I every now and then came upon, I forgot to mention a fact that struck me at the time—viz., that in the strata of semi-fossilized shells, by far the greater number were bivalves, the univalves being few and far between. What can be the reason of this? The shells all go safely up into store boxes, with the localities marked on the cover, so that I am sure you will have little difficulty in identifying them when they reach you. I got a splendid specimen of an Asterias on the beach, and dragged another out of the water on a fishing line, but most unfortunately it was quite insensible to the honours that I had intended for it; and, before I could seize it, it let go its hold on the line, and was lost to science for ever. The chief attraction of the voyage must, of course, be the birds; and, although I shall not trouble you with an account of every species that I have seen, yet I may mention the Albatrosses. It is curious to observe how the various species are left behind as one approaches land—first we met with the common Diomedea exulans; then, as we approached Australia, we left this species behind, and fell in with another, about whose specific name I cannot be certain; it is much smaller than exulans; then, when leaving Australia, and making for South America, we met with another, of the dimensions of a young exulans, with green bill, legs of a flesh colour, wings and back a dark brown. The length of its wings from tip to tip measure seventy-six inches, and from extremity of neck to end of tail thirty inches. As we approached the American continent, what a change in the appearance of the birds: those that I had seen on the voyage and at Melbourne (you know I was not inland) were nothing to them in loveliness and brilliancy of colour, but their names I cannot tell until I get home.

"I now re-open this to say that I am at Callao; and, as time is precious, must tell you what I think about it as briefly as possible. I take it to be a bad place for shells, although well investigated by Mr. Cuming; to be a first-rate locality for crustacea. With regard to the Echinodermata, I think it is also pretty fair; and, undoubtedly, it would be a first-rate place for an ornithologist. Just imagine seeing whole troops of pelicans, cormorants, divers, turkeys, not to mention gulls, gannets, terns, and innumerable smaller fry, all feeding together at the entrance of the harbour. Here one can see the pelicans pounce down head foremost to seize the unlucky fish—the gulls feeding by sweeping along the surface, the diver seeking and pursuing his prey far beneath the surface. Any one that could see these flocks of gulls would be convinced of the identity of Larus ridibundus and capistratus; as the same difference of plumage exists among these species here. I cannot find time to write

much more, but you shall hear from me soon. Lima is a large town, but that is all I can say for it at present. The road from Callao to it is very pretty, but dangerous, as it is invested by highwaymen, and I have been cautioned repeatedly not to be out after dark, so good-bye to catching moths by moon or lamplight; and now, having reached this fair country of the humming-bird, and fragrant with exotic flowers, being actually on Peruvian soil, a pleasure we both used to wish for so, I must make the best use of my time."

Also the following letter from Dr. Burkitt, of Waterford, on the—

OCCURRENCE OF RARE BIRDS IN IRELAND.

Within the last few years the following birds have come under my notice in this locality. In January, 1854, a bird, which I believe to be a male of the red-necked gull, in its immature state, was taken inland about two miles from Tramore, County Waterford, by John Strangman, Esq., who kindly sent it to me; the dimensions of which are as follows:—Total length from point of bill to end of tail, 17½ inches; bill, from forehead to point, 1⅝ inches; gape, 2½ inches; from point of bill to nostril, 1⅛ inches; wing, from carpus to end of second quill, 6⅞ inches; tarsus, about 2 inches; outer toe and nail, 2¾ inches; inner do., 2 inches; hind toe and nail, ⅝ inch; weight, 15 ounces; length of neck when stretched, about 7 inches; bird extremely thin and soft, as if much handled; sides covered with a dusky yellow margin; bill, upper mandible, same dusky brown colour as the head; under mandible, pinked yellow; when taken the bill was yellow towards the base, and greenish horn-colour towards the tip; feet, greenish yellow, on inner side. The colour and description of this bird nearly corresponds with that in Montague's Dictionary, Edit. 1831, except that this specimen was long-necked and slender, probably from its attenuated state when captured.

A bittern, differing totally from any that have occurred to me, both in markings and colour, and which is probably the *American Bittern*, was taken in October, 1854, in the County Kilkenny, within a short distance of Waterford, and is at present in my possession. The dimensions, previous to mounting, were as follows:—Total length from point of bill to end of tail, about 26½ inches; bill, from forehead to point, 2⅞ inches; gape, 3⅞ inches; wing, from carpus to end of third or longest quill, 12 inches; tail, 5 inches; tarsus, about 3 inches; middle toe and nail, 3¼ inches; outer toe and nail, 2⅝ inches; back toe and nail, 1⅞ inches; back nail about ⅝ inch. The nails are far shorter than those of the common bittern, so much so as to strike one immediately; the bird was an immature male; was attenuated, and weighed about 1¼ lbs.; irdes, orange yellow; eyelid, margined with the same colour; bill, above blackish; sides, greenish yellow; beneath under mandible, an orange streak, with a black streak or spot near tip (of under mandible) on each side; legs, greenish yellow; tail of 12 feathers. The following are the colours, to the best of my judgment, as I may err, being a very indifferent judge of colours:—Head, neck, and back, dusky or blackish gray, with yellowish streaks in centre of each feather; wing consists nearly of same colour, with broader streaks; quills, above, more of a dusky-gray, with broader and whiter streaks; under quills of a grayish-drab colour; throat of a dirty white, with a few blackish spots; breast and belly of same colour, with larger streaks than on the throat; thighs, grayish drab, with brownish streaks; tail of much the same grayish drab as under surface of wings; under tail and vent white; a dark greenish naked skin between the bill and eyes; legs, greenish yellow. A specimen of the female ruff, a scoter, but terribly shorn of its feathers; the former shot at Kilbarry, within a mile of Waterford; the latter obtained in Tramore. A fork-tailed petrel, taken alive from a hawk, near Kilmacow, County Kilkenny, October, 1852. Two others of same kind (P. Leachii) were found on the banks of the Suir, near Waterford, dead, the same season. Some two or three specimens of this bird occurred in 1848-9. The hoppoe, common petrel, turnstone, gray plover, lesser hen, and green sandpiper, have occurred in many instances of late, and the spotted water-rail has become more frequent than formerly, probably from having been more sought after. The skua I have seen *occasionally* during the last three seasons, about October and November, one only at a time, chasing other gulls (as recorded by all observers of this bird), both at Tramore and at Dunmore West.

The brambling has been obtained on four occasions within a short distance of

Waterford, during the three last years, and several siskins visited us in the summer of 1852; both these birds were unknown in this neighbourhood previous to 1848, as was also the bullfinch, which is now (or was, at least, last year) plentifully distributed in all directions round Waterford. The severe weather last winter may have affected this bird, as most of the small birds, and even blackbirds and thrushes, have been fearfully diminished in numbers, both by the inclemency of that season and also by the attacks of crows, or rooks, which, on many occasions, I have myself seen hawking at and killing blackbirds, thrushes, fieldfares, &c.; and even on one occasion a woodcock, which fell a victim to the attack of its assailant."

P.S.—I forgot to mention, some time ago Dr. Farren informed me that he saw some specimens of the little gull flying over the river, and about the bridge, at Waterford; I think in the winter of 1849.

G. F. Shaw, Esq., F.T.C.D., was elected an honorary member.

W. H. Ferrar, Sch. T.C.D., F. D. Kift, Esq., T.C.D., were elected ordinary members.

William Smith, Esq., Professor of Natural History, Cork, Richard Allman, Esq., Bandon, were elected corresponding members.

John Bain, Esq., Curator, University Botanic Gardens, was elected an associate member.

FRIDAY, JANUARY 18, 1856.

R. Ball, LL.D., President, in the chair.

Dr. Lamprey, 15th Regiment, read the following paper—

ON THE VEDDAHS OF CEYLON. (Plate 3.)

Ceylon presents an interesting and comparatively uninvestigated field for ethnological research. Situated in such close proximity to the thickly populated continent of India that the intervening channel is barely wide or deep enough to maintain its insular character, it might almost be described as a promontary of India. It is placed between 5° 55′ and 10° 18′ of north latitude, and between 79° 50′ and 81° 41′ of east longitude, and in superficial area may be said to equal Ireland. Diversified in its interior by high mountain ranges, it possesses every variety of climate from tropical to temperate; and, being under the influence of the monsoons, it is free from any vicissitudes of excessive heat or moisture. Having a fertile soil, and being abundantly supplied with water by numerous rivers and tanks, its vegetation at all times presents the most beautiful and luxuriant appearance; and throughout its whole extent it is covered with dense jungle forests, which abound in game and vegetable products fit for food and other uses. With all these advantages, however, of position, climate, and fertility, Ceylon, though called the Garden of the East, is but a very thinly populated country. It scarcely numbers more than a million and a half of inhabitants at the present day, though there are sufficient evidences extant to show that, at one period of its history, it must have maintained a very large population; and there is no reason why it should not do so again if the means of irrigation practised by the former inhabitants were again restored to their former usefulness. But if the population is small, it is not deficient in variety of races and castes and mixtures of races composing it, the history of any one of which would be sufficiently interesting to us. Thus, independent of the Singalese, who are Budhists in religion, and speak their own language, and who comprise numerous castes and families, there are Tamuls, who are next in point of numbers, who also are divided into several castes, speak a different language, are Hindoos in religion, and inhabit the northern districts of the island; there are Moormen and Malays, who are Mahomedans; there are descendants of the negro race, from Mozambique, brought as slaves by the Dutch from South Africa, and erroneously called Caffres; and besides, men from the most distant parts of the globe, there is a motley group of mixed races to be met with in the large towns of

the island, among whom the Portuguese element largely predominates. It is thus that we account for the great variety in the physical characters, in the languages, religions, habits, and customs and costumes of the population of the present day.

That the population of the island was originally derived from India might be inferred from its close proximity to that continent; and this supposition receives confirmation from the extensive antiquarian remains that are to be met with throughout the island, bearing resemblance to similar remains found on the continent, and from the well-attested historical evidences of the frequent inroads it has been subject to by predatory bands from India; and, lastly, from the fact that the greater portion of the inhabitants of the north of the island, at the present day, are identical in physical characters, language, religion, manners, and customs with the people living on the opposite coast. It is not to the mainland alone, however, that we have to look for the sources of the numerous distinct and mixed races of men that are to be met with in Ceylon at the present day; from its geographical position, it became, at a very remote period of time, the centre of an extensive maritime commerce that existed between distant nations of Asia; and thus, independent of the intercourse from India, the Arab and Persian on the one hand, the Malay and Chinese on the other, and more recently (since the conquest of the island by the Portuguese, Dutch, and English) the western Europeans have exerted no inconsiderable influence on the variety of its population.

Time would not permit me, on the present occasion, to enumerate all the castes or subdivisions of the Singalese, who constitute the great bulk of the population; suffice it to say, that those living on the coast and low country are of a dark complexion, and inferior in physique to the Kandyans, or hill-country Singalese, who are mostly fairer, and speak the language in its greatest purity; their traditions and history show that they originally came from India, and introduced the Budhist religion, and whatever arts of a civilized life are to be met with amongst them. They have a written history, and a small literature, in Pali and Singalese, and were always the dominant race till conquered by the English. Related to these by being largely mixed up with their race, and bearing many characters in common, though of purer descent, there is a race of men inhabiting the north-east and east of the island whose history cannot fail to be interesting to you, inasmuch as they represent the type of the early inhabitants of Ceylon, and bear remarkable correspondence with the early inhabitants of other countries more remote. I allude to the Veddahs, or wild men of Ceylon, concerning whose history, judging from the meagre accounts of them in recent ethnological works, there is comparatively nothing known. Thus, Dr. Latham, in his "Ethnology of the British Colonies and Possessions," dismisses them very briefly, and associates them with cannibals. Knox and Davy give the best accounts of the habits of these people, both of whom have had the opportunity of obtaining their information from direct observation.

A few years residence in Ceylon has afforded me the opportunity of collecting a history of the habits and customs, and of observing the physical characters of this interesting race, which I hope will be the means of giving a more correct account of them, as well as of adding much new information concerning their history. They constitute but a small portion of the inhabitants, barely numbering 4,000. Though formerly they were more numerous. Their name is derived from the Singalese word *wedda*, meaning a *bow man*, in its primary signification, and *wild*, in its secondary; hence the verb *wedinawa*, to shoot with a bow. The portion of the island where they are to be met with extends northward to a few miles of Trincomalee, eastward towards Batticolao, southwards towards Badulla, and westwards to the borders of the central province. This constitutes the district of the Veddah rati, or Veddah's country, of which Bristeune appears to be the headquarters, so to speak. This must have been an important place at one time, as it is here, according to the Singalese legends, that Budhoo is supposed to have alighted on his first visit to Ceylon. For a description of the Veddahs of this particular locality (who are generally called village Veddahs, to distinguish them from the Veddahs living in remoter districts) we are indebted to the Rev. J. Gilling, who has contributed the following interesting history of them to the Ceylon Asiatic Society, as published in the last volume of their transactions.

"The population has increased gradually of late years, but it is not easy to say what relation it bears to former times, as no records appear to have been kept, and very little interest to have been taken about the people by the Dutch or the Kandyan Government. Our attention at present will be directed almost exclusively to the Veddah population of this region, forming, as is supposed, about one half of the number here given. Several intermarriages having taken place between the two peoples, it is not easy to make an accurate estimate of each. Various are the conjectures entertained as to the origin of the Veddahs. That which obtains most credit is the following: that the Veddahs originally formed a part of a Singalese community resident on the coast of India, and were from thence transported to this island at a very early date for certain offences, before the Singalese as a people came to these shores. It is certainly probable that they were among the first, if not the first, inhabitants of the island.

"Their language is a corrupt dialect of the Singalese; being mixed up to a large extent with Singalese people, they understand the common language and can speak it, but among themselves they generally prefer their own inferior dialect. As they have little to do with the Tamuls, the majority of them, unlike the coast Veddahs, are quite unacquainted with the Tamul language. Their present habits, as contrasted with their former, in many instances present the aspect of civilization and improvement. Formerly they lived entirely in holes in the rocks, and wandered about the jungle, living on nothing but yams, honey, and flesh, procured in hunting. They were very wild in their character and shunned human society as much as possible. They clothed themselves with the bark of trees and leaves, and had no fixed habitation. Since the English Government, about six or seven years ago, took an interest in these unhappy outcasts, and calling them together built them houses, planted trees for them, and supplied them with food, they were brought to abandon, to some extent, their old habits, and take an interest in agricultural pursuits. They began to cultivate chenas, sow natcherry, plant Indian corn, and attend a little to their cocoa-nut and plantain trees, some of which are now in bearing. A very few, however, attended to paddy cultivation. All of them now have small huts, built of sticks and straw, besides their rock houses, which belong to different families, and are divided into several compartments. To these latter they have still recourse, when out in the jungle during the inclement season.

"Whilst on a visit to them in October last (1849), I saw two or three families living on large rocks: here they cooked, ate, and slept, while others of their companions were away in the jungle, seeking roots for food or attending to agricultural operations: they will frequently exchange the few commodities they possess or grow for cloths or ornaments of various kinds. The women are exceedingly fond of a profusion of beads, necklaces, ear-rings, and ornaments for the hair; and they load their children with rings round their waists, arms, and fingers, bells on the toes, and necklaces in abundance. Their food consists of natcherry, rice, pumpkins, brinjall, and other vegetables of native growth, as well as the flesh of the monkey, guana, and wild hog; they chew the bark of trees as a substitute for the betel and areca nuts, of which they are very fond when they can obtain them. A bow and arrow were their only weapons in former times. Now some of them possess guns.

"Murder was formerly exceedingly common among them, now it is less so; they were accustomed to cut their victims to pieces with axes, or to shoot them with bows, and if found out in the crime, they were required by their headman to make compensation to the surviving relatives by the payment of about five and twenty shillings, or something equivalent, this being the price of a slave. The uncle of the party aggrieved usually enquired into the matter in dispute, and the elders settled the case. An uncle had power to sell his nephew; the price of a female slave was double that of a male. Adultery and polygamy are still common among them. If a man does not like a woman whom he has married, he will, after a year, take her back to her father's house and give her into his charge. Theft and lying, too, are still prevalent. At the latter they are particularly expert, and seem to evince nothing like shame when discovered. I met with several instances of this amongst them. In the time of their headmen, those who committed theft were beaten or kept to hard work in the headmen's houses. In particular cases, they were carried before the Kandyan kings. Their headmen were called Thissarvu. They received no salary from the Government, but practised extortion on the people. The only headman of themselves unconnected with the Government is called Rollah. He has no power over them, and can only give them advice. The Udeyar receives from Government five dollars per month, and the Vidahn is paid for petty cases.

"Of agriculture they know but little, some of them cultivate a chena for a year, and after reaping a crop, wander to some other place. Where they plant trees they will generally stay longer: they turn up the ground with mammotties, but know nothing of ploughing and manuring, and attend little to either fencing or watering; consequently, they frequently lose all the fruit of their trees and labour from the attacks of wild beasts that infest the jungle around them. Some of them keep a few buffaloes. For paddy

they pay tithe to Government, but not for Indian corn or natcherry. They trade principally with Moormen, with whom they barter their honey, fowls, &c., for rice, cloths, or ornament. They purchase bows from Vellase, and exchange various commodities among themselves. Many of them are beginning, however, to learn the value of money.

"They are fond of shooting and hunting, and will go out to the jungle for weeks and even months together; when out they procure honey from the rocks by attaching themselves to long sticks fastened to bushes and trees on the sides of the mountain, and then, crawling down to the sheltered place in the rock where the honey is deposited, and having smoked out the bees and taken the honey, they pull themselves up again in the same way, and then descend the mountain with the spoil, which they divide equally among their companions. Many of them seem to prefer these pursuits to the steady and monotonous occupations of husbandry. Their love of a wandering life is not extinguished, and they court independence and freedom from labour. If introduced to the bustle of towns and the restraints of society, they break away as soon as possible to their beloved solitudes and their old companions, preferring a life of hardship in the jungle to pampered indulgence out of it. I tried hard to induce an orphan lad, of apparently bright parts, to forsake his home and come with me to the Mission station, that he might be boarded, fed, and educated, so as to be fit for some useful employment, but he was deaf to my entreaties. 'When I am hungry,' said he, 'I chew the bark of trees and pluck roots; when I am cold, I light a fire and warm myself; I want no books, nor learning, nor money; only give me an axe and I am content.'

"Their medicines are made from the bark of trees, roots, and leaves. Some are said to be very efficient in curing diseases, and especially hurts from wounds and snake bites. For fever they take pills prepared by Singalese doctors. Like most natives, they use charms, and tie strings round their waists, which they believe will remove the disease under which they labour. Of late the Government has done little for them; and as they have taken few precautions to provide for their own necessities, it is not easy to say how long they will continue in fixed habitations, should their crops fail. Doubtless, the aid formerly afforded them was designed not to supersede, but to stimulate, their own exertions; but the philosophy of this they are scarcely at present able to understand.

"They assist the Singalese among whom they live in various matters by working for them, and thus a few of them learn to cultivate chemas and to take care of their crops in houses.

"Of *education* they are totally destitute. Formerly schools were established and supported among them, but the labour and money spent thereon were in vain. The people had no taste for learning, and wanted their children to accompany them to the jungle in quest of food. They have no written language, and can only count to a very limited extent. Their habits at present are certainly too migratory to present any encouragement to systematic efforts for their instruction.

"Their *religion* is devil-worship. They will acknowledge that there is one God, whom they believe to be greater than the devil, but him they neither fear nor worship. One of them said to me, 'When God gives us food, we are glad, and wish him to sit on our mat; when he does not, we curse him, and will not allow him to do so.' They appear to know little or nothing of a future life, of heaven or hell, where the soul goes to when it leaves the body, or whether it will be happy or wretched. A number of them were formerly baptized* on a profession of faith in Christ and willingness to abandon their superstitions; but almost all of these have gone back again to their former habits and follies. What they formerly heard they have forgotten. They declare it impossible for them to live without devil-worship. 'When they did so, their children were sick, their cattle died, their trees would not bear fruit, and their crops were cut off.' It was vain to expostulate and argue. They believe the souls of their departed relations to be devils who have power to hurt them, and therefore they perform ceremonies to them at regular seasons, and especially when they are sick. The Singalese who live among them exert a bad influence over them in these respects. It is very difficult, indeed, to get fit persons, who know their language, to labour among them. Without these, desultory efforts will be of little service. The Veddahs are mostly low in stature, but some of them are strong, active men, and most of them appear to be healthy and little subject to disease. They differ considerably from the coast Veddahs in their habits and dispositions. The latter appear to me far more tractable and hopeful. They have improved much by the instructions they have received, and are tolerably well acquainted with the leading truths of Christianity."

It is by no means an easy matter to meet with these people in their native haunts, as the sportsman seldom sees them; and should he by chance come near one of their bivouacs, the men, women, and children rush into the jungle and hide them-

* Up to 1844 there had been baptized in Bintenne 163 men, 48 women, and 85 children; since hat time very few have received this rite.

selves, just as wild animals would do. I recollect expressing a wish, to a rather intelligent and well educated native, to see one of them in their native haunts, but he said it would be very difficult, if not impossible, and recommended me to bring a gun and shoot one, as my only chance, as if a Veddah were nothing more than a monkey. I was rather surprised at this remark; for, independent of its criminality, it was contrary to what one expects from a native, who always considers the Veddahs as very high caste people, and respects them accordingly. Occasionally, however, they do overcome this repugnance to approach civilized people, and when labouring under any grievance make their complaints in person before the government agents in the neighbouring districts. We have seen by the paper I have just read that their habits are quarrelsome; but this, I have been told, is owing to the encroachments of distant families on their hunting grounds, nor is it unlikely that murder should be of frequent occurrence among people living in such a condition. You will presently have an illustration of the moral, as well as the physical, condition of these people, as the individual to whom we are indebted for their portraits, and much information as to the habits and customs of his race, has been an inmate of Wallicodde gaol for the last few years, having been convicted of murder at the Kandy assizes of 1850.

He was about thirty years of age, five feet three inches in height, of a dark brown complexion, and having black hair of a glossy, soft texture, which he wore tied up in a knot on the back of his head after the manner of the Singalese, though in the forest he usually wore it loose, as seen in the drawing of one of them taken from a photograph; the upper part of his body was rather stoutly built, but his abdomen was protuberant from the abundance of curry and rice of the gaol diet and the want of the usual active exercise of his forest life; his lower extremities were out of all proportion to the rest of his body, there was a peculiar bowed appearance of the tibia, which, I believe, is common to many of the uncivilized races of men; his feet resembled those of the Singalese, but there appeared to be a wider space between the big and first toe, and he seemed to possess the power of using his foot as a prehensile organ to a considerable degree; for, on letting fall my pencil he took it up with his toes with as much facility as if it was his hand he was using. You observe in this drawing, also, how useful his foot is to him in stringing his bow. His hands were small, his fingers short and taper; his arms, though small, were pretty well developed; his face was small, and wore a placid, stupid look, but became animated when speaking; his forehead was narrow, but not retreating; his eyes were of the usual size, and not deep set; the iris was dark brown, and the conjunctiva had that dusky yellow hue observable in the other dark-skinned races; the nose was aquiline, and widened at the alæ; his chin was moderately rounded; he had but a very scanty moustache, and a few hairs on his chin, and no whiskers. But in the smaller photographic portrait* you see rather a good beard and moustache; the lobe of each ear was pierced with a triangular-shaped hole, which, he said, was done by his mother, when he was young, with a sharp-pointed stick, and that such was the custom of his people. He had no name, nor was it customary to give each other any other names than big or little man or woman, big or little boy or girl. He said he had a wife and children; that their usual mode of marrying was merely making a good present of deer's flesh or honey to the parents of the girl, and if they were willing, she went to his place of abode without any ceremony; if he did not like his wife, he could send her back at any time, and she would be received by her parents. They do not cultivate the ground, being content for vegetable food with whatever stray yams or fruits they find in the jungle. Their chief source of sustenance is deer's flesh, which they usually roast over a fire on sticks, or boil it, if they are fortunate enough to possess a chattie, or earthen pot. It very often happens that they are in a state of great distress, from a scarcity of deer, honey, or yams, in their neighbourhood, and, consequently, they are constantly changing their place of abode, seldom remaining longer than three or four days in any one place. This uncertainty in the supply of food obliges them to be provident for future wants, so that when they kill more deer than they can immediately consume, the surplus is cut into pieces, placed on a wooden frame, and

* See plate iii., fig. 1.

dried over a fire; it is then soaked in honey, and carefully packed in bark, and hung up in a tree, or placed in the decayed stem of a tree, and plastered up with mud, where it remains secure from ants and flies. This man said he never knew of these stores to be stolen by other Veddahs, nor are they addicted to stealing from each other; if such an instance occurred, it is likely the offender would be summarily dealt with by the injured family. They have the habit of continually masticating the bark of trees; this may be a modification of the beetle nut chewing, so much practised in the East; and Davy alludes to their eating the bark when reduced to want, which some recent writers have modified into living on decayed wood. A number of Veddahs who came to the government agent to make complaints were observed to be constantly chewing bits of bark, which they cut off a neighbouring tree with their axe.

The description he gave me of his dwelling corresponds with that given by Knox and other writers; they are constructed of branches of trees, interwoven in the rudest manner, and open to the weather on all sides; these are placed against the stems of the largest trees, for support and shade; if in a district where elephants abound, they resort to the trees, and in very wet weather, or during their hunting excursions, they make use of any caves that may be near. Their dress consists of a cotton cloth wrapped round their loins, but up to the age of puberty they go about naked; this piece of covering is procured from the Singalese or Moormen traders, who frequent certain localities at certain times of the year for the purpose of barter. They exchange cotton cloth, arrow and axe heads, bows and arrows, and bead ornaments, for elephants' tusks, honey, deer's flesh, and elk horns. Very frequently they prepare this covering for their loins from the bark of the sack tree, *Artocarpus saccifera*, a species of bread-fruit tree, which is very abundant in the jungle. It is simply prepared by steeping the bark in water for a few days, and beating it with stones till it becomes soft and pliable, reminding one of the paper mulberry cloth of the Sandwich islanders. It is usually made four feet long and three feet wide, but composed of many pieces, which are sown together with the fibres of some jungle plant.

I have here a bow and arrow made for me by this man, the former is a little more than six feet long, and made of the areka nut tree; it resembles this one made at Velasse, and used by the Veddahs in their hunting excursions; it has got the usual string made from the fibres of the wild plantain tree, the arrow is a little better than 2 feet long, and pointed with iron made after a particular shape, which is about 3 inches long, half an inch wide, and lancet shaped; they are procured mostly rom the Singalese and Moormen traders, who require to be very particular as to the pattern. I was anxious to see what success he would have at shooting at a mark, but on his trying several times within a distance of 60 yards, I found his shooting very inferior; he was evidently much disappointed himself, and said it was owing to his being out of practice. According to his own statements, he must have been a very good shot, as he said he has killed from three to six deer in a day; he has also shot two elephants. I inquired particularly how he did this, as I heard it stated that they shoot elephants in the same manner that the tribes in South Africa are reported to shoot the South African elephant—that is, by creeping quite close to the animal, and shooting a poisoned arrow into the sole of the hind foot as it is raised from the ground; but he said that such was not their practice: he shot his elephants as Gordon Cuming would do, by shooting them through the body. We can well understand to what a depth an arrow of this description, driven by such a powerful bow as the Veddah's, would penetrate into the body of any elephant, particularly when the animal would be only a few yards off. In these three diagrams you may observe their method of shooting with the bow; it is held in the right hand, whilst the string is pulled with the left, contrary to our method; their mode of carrying their bows and arrows on proceeding on shooting excursions; and their mode of stringing the bow, showing also the use of the foot in stringing the bow.

Another weapon used by the Veddahs is a small axe, the head of which is made of iron, about four inches long, and its cutting edge about two and a-half inches wide, its weight about one pound, and it has a hole for fastening the handle, which is about three feet long. The accompanying engraving* represents a Veddah holding one

* *Vide* plate iii., fig. 1.

of these axes; it is a very useful instrument to them, for, if attacked by bears or other wild animals, they are capable of defending themselves with it, or they can cut out a hive of honey, or lop off the branches of a tree to construct their huts; their axe-heads bear a very close resemblance to the celt of the ancient Irish in our museums.

The diseases to which they are chiefly subject are intermittent fever and dysentery, and result from exposure to wet and insufficient food; these they treat in the simplest manner. A shady place is chosen for the sick man, and a few large leaves are placed over him, he is given plenty of cold water to drink, but no food; the bark of the wild mango and one or two other jungle trees is collected, and pounded between stones to express the juice, which is mixed with a little water and given him. Occasionally, when affected with chronic complaints, they obtain medicines from the Singalese traders. If they die, a hole is scraped with a stick near where they are, and the body is thrown in and barely covered over; sometimes they merely throw some leaves over the body and leave it there, and, of course, it is soon made away with by wild pigs or jackals; thus, it is very difficult to obtain a skull of these people: the one I was fortunate to make a drawing from is, as you observe, without any bones of the face.*

This man spoke and understood the Singalese language, though some of his words were different to the ordinary Singalese spoken in the low country. I had a small vocabulary of names of familiar objects by me; but I regret to say I have put it by so carefully I cannot find it at present. The Veddah's words were like Singalese, and appeared to differ only in accentuation and terminals. They have a patois, however, common among themselves, which a Singalese or Tamul could not understand. Turnour suggests that this dialect is the ancient Paisachi alluded to in the Mahawanso.

Mr. Greene, the Governor of Wallecodde Gaol, has appended to his report a short history of this man since his admission to gaol, he says:—

"On first beholding the works carrying on in the prison he expressed much surprise, and on being placed to work in the carpenter's shop, commenced with much apparent interest and with some confidence, exclaiming, when the method of using the tools was pointed out to him, 'Oh! I can do that.' His progress has not, however, been very encouraging, and bears no proportion to that of other prisoners who have been engaged a similar period. The same must be said of his progress in learning to read, since during the three months he has been attending school he has only mastered nine letters of the Singalese alphabet; but in arithmetic he has succeeded somewhat better, his knowledge of numbers not having extended beyond six when he was admitted, whereas now he is able to proceed as far as eighteen. His manner of expressing himself on any subject requiring figures is by immediately telling the numbers on his fingers. When he wishes to convey the idea of size or bulk, it is by placing his hands in a position similar to that which they would occupy if they grasped the article; when telling the age of his children he places his hand at such a distance from the ground as the head of the child may be supposed to reach; and in speaking of any particular time of day, he points to that part of the heavens in which the sun would be at such an hour.

"He has no idea of a soul, of a Supreme Being, or of a future state. He states that he sees the sun rise every morning and the darkness come in the evening, and that is all he knows. He is conscious of no difference between the wild beasts who roam through the forest and himself or his fellows; and thinks there is no existence after the body is once dead. He does not know who made the world, but believes, now, that *some one must have made it.* He has heard some of his people talk about a superior being called 'Wallyhamy,' but whether God or devil, good or evil spirit, he cannot tell, and only speaks of it because he hears others do so. He is not afraid of it, and does not pray to it.

"On his denying all knowledge of the devil, the discrepancy of this statement with the one made on his trial was pointed out to him. His reply was, 'I do not know anything of these things, but people in other parts know them, and I am afraid because these people can injure me.'

---

* *Vide* plate iii., fig. 2.

"He thinks his people live perfectly happy in their forests, feeling neither envy nor sorrow at the better dress and dwellings of the native Singalese. His people were born in the condition in which they are now, and would be very unhappy if they were removed from it."

A native publication, the *Lanka Nidhana* (Treasure of Ceylon), gives the following account of his trial :—

"At the last Criminal Sessions of the Supreme Court a certain Veddah (or wild man) was convicted of a murder. He admitted that he killed the deceased from a fear that he, the deceased, would at some future time take away his life, as he did that of his two dogs, by means of his magic or charms.

"Three male Veddahs and one female attended as witnesses in the case. One of the elderly Veddahs was questioned—'Who gave him life?' He answered—'He did not know.' To the question, 'Who was Budhu?'—he said, that 'he never saw him.' Referring to a Budhist priest that was standing by him, he was asked, 'Who that was?'—the wild man answered it was 'a Capoowa, or god's priest.' He also intimated his displeasure at seeing the priest covered with a long and useless garment. One of the Veddahs had a thread tied round his arm, and said it was tied by a low-country man, because he was crippled in his fingers. But the old Veddah remarked, that it was only a delusion, as the fingers remained as crippled as before. The convicted Veddah will, in all probability, be sentenced to a few years' imprisonment and be taught to read. The jury prayed for mercy towards him, as he was as ignorant as a beast.

"The statement made by the prisoner on his trial was as follows—'that the deceased killed two of his dogs by witchcraft and charms, and was proceeding to kill him also in the same manner, having made a devil's offering and placed it in his (the prisoner's) compound with that intention; that to prevent this he waylaid the deceased one day, while walking through the forest accompanied by his wife, and after watching them till they sat down together, he came behind and struck him a blow on the ear with a club which he had with him for the purpose; that the deceased instantly fell dead on his face, while his wife, apprehensive of the same fate, darted off into the jungle. He then dragged the body into a more retired spot, dug a hole in the ground with a stick, and buried it. Afterwards he went to the place where the wife of the deceased lived, and warned her not to tell any one of the murder, or he would take a similar revenge on her.'"

Passing from Ceylon to the continent of India, we find that, independent of the identity of the Tamul portion of the population of the island with those of the coast, there are districts inhabited by men who bear considerable resemblance to the Veddahs in mode of living and in physical characters. I have extracted the following account of one of these Indian mountain tribes from a local newspaper which is sufficiently accurate for our purpose, though I fear that the very diminutive size and rather flat features attributed to them may puzzle us a little; however, the dark skin, long bushy hair, the use of the bow and arrow and the axe, are sufficient to show that an analogous race to the Veddahs inhabits the continent, and, perhaps, an analysis of their dialect would prove them to be derived from the same stock, if they are not identical.

The "Cattoo Coorumbers" are the aborigines of "Ryanadu," or, as we corrupt it into, "Wynaad," which is a small district in North Malabar, consisting of table land, situated on the top of the Western Ghauts, and, as the name signifies, the open country, which seems, by the way, rather inapplicable, as it is mostly overrun with thick jungle. The "Cattoo Coorumbers," like most savages of the wilds, are a stunted, diminutive race, rarely exceeding four feet in height, very dark in complexion, with rather flat features and slightly made. They allow their hair to grow in its utmost luxuriance, and as the use of the comb is not general, and they have a great dislike to water, a Coorumber's person clothed in its filthy rag may be imagined, though any description must fall short of the original. A Coorumber and his wife (the women are called "Coorumbatees") only possess two cloths between them—the former fastening it around his waist, the latter beneath the arms, and these garments are never replaced, however filthy they may be, until they will no longer hold together. The boys until 15 years of age and the girls until 12 run about without a stitch on them, and so soon as a boy can earn himself a cloth, he gene-

rally provides himself with a wife! The marriage expenses of the Coorumbers, unlike those of other Eastern races in general, being very inexpensive, the whole affair is gone through with an outlay of 96 pice. The habits of these people are very primitive, and their actions appear to be guided chiefly by natural instinct. In their native jungles they generally fly at the sight of an European, so completely uncivilized are the race; but we are trying to get them in now. The Coorumbers do not appear to be sociable in their tastes, as they are rarely to be found in a number together, each small community consisting entirely of near relatives. The Coorumbers evince no care for the morrow, looking only for the present, and their wants are so few as to be easily supplied; for they live chiefly upon certain roots, yams, &c., and some particular creepers, to be found in their jungles, rarely tasting rice save at the harvest time. Their offensive and defensive weapons are the bow and arrow, which they handle with great dexterity, and wherewith they shoot with admirable precision. The power of the Wynaad bow is very great, indeed. The late Major Bevan, in his amusing work, relates an anecdote of a poor Ryot who had lost one of his buffaloes, which was killed by a tiger. The Coorumber, determined on wreaking his vengeance, lay in ambush behind a slight screen near the carcase. The tiger came, as expected, to make a second meal; and the Coorumber, bending his bow, discharged an arrow with such force and so right an aim as to pierce the tiger's heart. The monster, when struck, bounded into the air, and fell stone dead on the remains of his victim, to the great pride and satisfaction of the Coorumber, who received a reward of 10 pagodas for his skill and prowess, which sum enabled him to make up more than the loss. The same writer mentions that at an exhibition of archery in presence of the Right Honourable S. R. Lushington, then governor of Madras, the Coorumber seldom failed in hitting a rupee at a distance of from 60 to 100 yards, and never failed to strike the mark within the space of a man's body at that distance. Their skill with the axe is very great, and they are thus of very great use to the coffee planters in clearing their grounds.

It might be expected that the inhabitants of the Andaman Islands, situated at some distance eastwards of Ceylon, would resemble the Veddahs; but you will at once see from the following recent description of them that they are evidently too Papuan in their character to bear any resemblance.

They seldom exceed five feet in height, with protuberant stomachs and disproportionate and small limbs, they have the short curly hair of the negro, flat noses, thick lips, and small red eyes, their skin is sooty black, and their countenances exhibit the extreme of wretchedness, want, and ferocity. They live in a state of nudity, and besmear themselves with a thick covering of mud, to preserve themselves from the bites of desperate insects. Their implements of husbandry and war are of the rudest kinds. Their lines for fishing are made of the bark of trees, their hooks of burnt wood and fish bones. Their bows are four or five feet long, made from the fibres of a tree on slips of bamboo, and arrows of reed, tipped with fish bone or wood hardened by fire. Their spears are made of the same material, and their shields are made from the bark of trees. Their fishing-boats are made from the trunks, and their nets from the bark of trees. Fish is very abundant in the bays and creeks of the islands. The variety and number of cattle is small. A few diminutive sized swine are found on the skirts of the forests. Though fish is the principal food of the inhabitants, they eagerly grasp at whatever nature provides—birds, rats, and insects are eagerly devoured by them, and often in a half cooked condition. The birds found in the islands are the hawk, paraquet, kingfisher, and quail. The edible bird's nest is also found in the rocky crags. The fruit of the mangrove steeped in mud has been found in their huts, and this, with sundry roots and leaves in a raw state, constitute their vegetable diet. They do not even possess the cocoa-nut. The only animals they have, besides those mentioned above, are rats, the ichneumon, with snakes and scorpions in great variety. The trees are, the guava, the banyan, almond, the oil, and wood trees. Iron wood is in abundance. Parasites of almost every hue and kind abound. The red wood is almost equal to mahogany. The rains are very heavy, 98 inches fell in seven months, and the hurricanes which pass over the islands are represented as terrific.

That the people are cannibals there can be no doubt, and the only ornaments they wear are the teeth and skulls of their enemies or those who have fallen a prey to their ferocity.

They paint their eye-lashes and heads with a kind of red ochre, which gives them a most hideous appearance. Their habitations are extremely rude, they are composed of sticks stuck in the ground, fastened at the top with the fibres of trees, from which branches of trees are suspended, with an aperture for smoke to escape through. Leaves are their only bed. Polygamy and infidelity are, as far as has been ascertained, unknown amongst them. They are much attached to their offspring, and the women are the slaves of the men. They have no idols, or caste nor any chiefs; physical strength and cunning being the only things which give a title to superiority. Such are the islands and such the people of the Andamans.

It may startle us to suppose that any relationship could exist between the Veddas of Ceylon and the early inhabitants of Ireland; but, when we come to inquire what were the physical characters of the early Irish and their mode of living we find such a very remarkable correspondence between them as to lead us to suppose that the early Irish might have been literally, as well as figuratively, Veddahs.

From the researches of Mr. Wilde and other ethnologists, we are enabled to form a pretty correct idea of the physical characters of this race—the Fir Bolg, who are considered to be the earliest Irish—whose remains are frequently found in the ancient sepulchres of Ireland, Denmark, and Sweden; and are easily distinguished from the remains of other early inhabitants. They are characterised as the globular-headed Irish, and, from an examination of their skull, it was inferred that they were low in stature, of dark complexion, and had aquiline noses, or, to quote from a paper read by Mr. Wilde before the College of Physicians, on the ethnology of the early Irish :—

"The facial portion of these heads being small, without doubt the whole body was not above the middle size. The traces of the facial muscles, on the other hand, were exceedingly strong; the play of the features was, therefore, during life very energetic. The orbits or eye sockets are very small, low, and deeply hidden under the eyebrows. The nasal bones, as I have more than once remarked when describing the Irish heads, were particularly strong, prominent, and inclined towards the horizontal, with a deep grove or sulcus between their root and the margin of the brow. They must, therefore, have had strongly marked, arched, aquiline noses. In those casts and drawings which have been forwarded to me from Denmark and Sweden, the eyebrows with the superciliary ridge are remarkably prominent, and I am led to believe that the eyes themselves must have appeared small and sunken; and, says my correspondent, 'the small face, with the lively play of the features, the small eye, set deeply under the eyebrows, and the large aquiline nose, are characteristics which, taken together, imply a dark colour of the skin, eyes, and hair.' How admirably does this accord with the description of the Irish annalist Mac-Firgus!—'Every one who is black, loquacious, lying, tale-telling, or of low and grovelling mind, is of the Fir Bolg descent.'"

If we compare the skull of the ancient Irish with the skull of the Veddahs, we observe a remarkable resemblance. I have here a drawing of the skull of one of those Veddahs, the original of which is in the possession of Mr. Rawdon Power, the government agent of the central province of Ceylon, who kindly lent it to me for examination, and its genuineness is beyond all doubt. It is, as you observe, an imperfect skull, the facial portion being deficient; but its small size and globular form are evident; the superciliary margin of the frontal bone is well developed, and the sulcus above the nasal bones is as remarkable as in these early Irish heads* of the Fir Bolg descent. Comparing these heads with a recent Singalese skull† we remark the resemblance better, and it must be understood that the Veddah element, so to speak, largely predominates in the modern Singalese. In this skull we notice the globular form and that sulcus between the frontal ridges and nasal bones, from which Eschricht derives such important conclusions.

That these early inhabitants of Ireland lived in a very primitive state, there is no occasion to doubt; the remains of stone axes and arrow heads found in their ancient sepulchres alone would prove that they lived by the chase; their abode was

* *Vide* plate iii., fig. 3. † Fig. 4.

in the dense forests that we know at one time covered the country; their food, the elk, the deer, and the wild ox; their huts, no doubt, were of the rudest description, and their clothing, perhaps, as scanty as any Veddah's. Let us picture to ourselves one of these Fir Bolgs standing before us with his celt in his hand, his hair hanging loose over his shoulders, and his dark skin: would not this photographic drawing of the Veddah be a very good representation of him?

To account satisfactorily for the presence of a similar race of men inhabiting such distant parts of the earth might, no doubt, be a difficult matter, unless that we suppose the whole of Europe and Asia to be at one time inhabited by a race having the same physical characters, and existing pretty nearly under the same conditions; and this supposition, far from militating against any ethnological doctrine, would rather tend to confirm the idea of a great Indo-European family, though in a sense of greater antiquity to what is at present implied by the term.

To suppose that it was owing to any direct intercourse would not be so reasonable, though the traditions of our ancient bards regarding the origin of the first colonists of Ireland refer to the East as a starting point. That they were familiar with India and Asia would appear, for in their traditions the word Taprobana is of frequent occurrence; this is, as you are aware, the name by which Ceylon was known to the ancients; on the other hand, if we were to depend altogether on these bardic accounts, we might suppose that the Singalese were of Milesian origin, as it is recorded that Milesius stopped in Ceylon for some time after his departure from Egypt. It might, certainly, be a stretch of the imagination to suppose that Mileseus of the Irish bards, and Wijayo, the leader of the Singalese colonists, are the same individual. But there is some resemblance in the words Mileseus and Wijayo, and all we require is the legend of some enchantress like Circe or Kaweni to make the identity complete.

Laying aside such speculations for those interested in traditionary lore, we will briefly explain our reasons for supposing that the Veddah is the existing representative of the aborigines of Ceylon.

According to the traditions of the Singalese, recorded in a very old historical work called the Mahawanso, we learn that the early colonists found the island inhabited by demons, or yakkos, who had the power of changing themselves into sticks or stones, or appearing or disappearing just as they wished.

The term yakko may be regarded as a figurative expression, and may be interpreted in either of two ways—that the inhabitants were of savage habits, or that they were worshippers of the devil, or believers in magic. The latter I consider to be the proper meaning of the term, as we have a parallel instance in Greek history of the inhabitants of an island being described as devils, from worshipping the devil. Now, not only is devil worship practised by the Singalese of the present day, but also a belief in magic is, as we have shown in the history of the Veddahs, the only religious idea they have. I am borne out in this opinion by Turnour, who interprets the term thus:—It would appear that the prevailing religion in Lanka at that period was the demon, or yakkha worship. Budhists have thence thought proper to represent that the inhabitants were yakkhos or demons themselves, and possessed of supernatural powers. In further confirmation of this mode of interpretation, we might add, that the Veddahs are not Budhists, nor is devil worship, properly speaking, a part of the original Budhist belief, though now associated together. From this fact alone we might infer that the Veddahs were at all times independent of their more civilized brethren, and have existed as a distinct race from the time the island was first visited by Wyago. That they have changed in no respect from what they were 200 years ago we learn from Knox's narrative; but without resorting to tradition or history, it may be possible to infer, from the very degraded state of existence of these people, that they are descended from ancestors who were never more civilized than themselves; for I believe there is no instance on record of a race who were at one time even partially civilized returning to so degraded a state of existence, however possible it may be for man in his most savage state, from the resources within himself, and the Divine impress which he bears, to arrive at a partial civilization, which, ultimately, when proper influences are brought to his aid, may progress to the highest degree of excellence.

T. O'Mahony, treasurer, Esq., read the following communication

ON SOME OF THE CELTIC NAMES OF THE WATER-NEWT.

I feel I owe some apology for bringing under your notice a matter which, strictly speaking, can scarcely be regarded as belonging legitimately to the subject of zoology; but as it has, notwithstanding, a slight connection with that department of natural history which this Society has been established to cultivate, and may in itself possess some slight interest, I hope you will not deem the few observations I have to make thereon either irrelevant or misplaced.

My attention has been so much occupied of late with studies of a collegiate and professional nature that I have had very little time, indeed, to devote to the pursuit of natural history in any of its branches. My interest in it has not, however, been diminished; and I trust the time is now at hand when I shall have opportunities of again indulging in studies to which, many years ago, I was greatly attached, and of whose importance in every point of view no man can be more deeply convinced than I am.

With respect to the matter on which I am about to offer a few remarks, I may mention that my attention was recently drawn to the subject of the Water-Newt, by the perusal of a paper on that class of reptiles, contributed to the Dublin Natural History Society by Dr. Kinahan, one of the Secretaries of that Society, and a valued associate member of our own—a very able and most promising naturalist. On the interest and importance of his paper I shall not dwell. It is published in the first volume of the Natural History Review, page 76, and will amply repay perusal. As the author seemed, however, at a loss to account for the origin of the names by which the animal is generally known in the different counties of Ireland, and in those parts of Scotland where its occurrence has been recorded, and as various derivations have been suggested, I thought I might be able to satisfy curiosity on the point, by giving what appears to me, at least, a full solution of the question.

The Celtic names, then, as given by Dr. Kinahan are, I find, Dark Leukers, Daddy Leukers, Art Leukers, Arg-Loghers (so called by Dr. Rutty in his Natural History of Dublin), Derrig-na-diaoul, and Dearc Luachrach. The appellative Derrig-na-diaoul may, I fancy, be with safety omitted, belonging, as it does, and as Dr. Kinahan has remarked, to one of the Staphyllinidæ. I must observe, too, that I never heard the name applied to the animal under consideration. To the above list may be added the terms by which the common land lizard is known in the western parts of Cork and in some parts of Kerry, where, it would appear, the Water-Newt has not been found, and where, certainly, I did not myself, during a residence of many years, ever discover one. I cannot say that I searched for it with any great care; but as I was a tolerably close observer, I imagine if the reptile existed there it could not fail to come under my notice. The similarity, or rather identity, of the names applied to both the land and water species evinces a belief that both were the same animal, only in different stages of growth or development. In Cork, the land lizard is everywhere called the *Eas luachra*. In Kerry, I have heard it frequently called *Eascu Luachra*. Indeed, I do not remember to have heard it ever differently designated. Now, it is not a little remarkable that in every one of these names we possess an admirable logical definition, adhering as closely to rules as any advocate of the ancient syllogistic art could desire. The word *Leuker*, in the various forms under which it presents itself, always expressing the essential difference, and the first part of the compound denoting the genus to which the unscientific framers of the appellative conceived the reptile to belong. In every instance we find the specific name to be some modification of the word luachair—Luachair—the term applied in most places where Irish or Scotch Gælic is spoken to that genus of rushes botanically called Luciola—the genus Scirpus being denominated geataire—*geataire*. This name clearly indicates the usual haunts of the reptile and furnishes an additional proof of the expressiveness of the ancient Celtic tongue. Nor in my opinion are the generic names less appropriate or significant. They may, I think, be reduced to three, the epithet "daddy" being evidently not Celtic though there is a Celtic word of the

same signification, but never used in the same way; while we know there are many insects to which children among our own English speaking people apply that familiar word. Every person here, I suppose, has heard of some species of spiders called "Daddy Longlegs." We may, therefore, I conclude, omit this name. The term Dearc is evidently but a modification of the simple word Earc—produced by the operation of a general law in Celtic accidence, well known to Celtic scholars, viz., that the article exercises a certain influence on nouns, the character of the influence differing according to the gender of the noun and the nature of its initial letter. In the case of masculine nouns beginning with a vowel the influence just alluded to would prefix a T to the nominative and accusative. Earc would then become Tearc—easily corrupted into Dearc, as all philologists are aware how readily T and D, letters of the same organ, are interchanged. Art and Arg are obviously corruptions, or at least modifications, of Earc; and in this way we succeed without much difficulty in reducing the generic names to three—Earc, Easg, and Eascu.

The word Earc is used in various senses, and it is by no means easy to ascertain in which of them it is employed when made the generic name of the reptile to which it would appear it is very generally applied; though, for my part, I confess I never heard the word so applied in Cork or Kerry, the two counties with whose dialects and Fauna I was most familiar in boyhood. O'Reilly, in his Irish Dictionary, among many other meanings of Earc, gives that of lizard; O'Brien does not give it in that acceptation; and the dictionary published under the auspices of the Highland Society of Scotland only follows O'Reilly in explaining the term. The only sense of the word that appears to be in any way expressive of anything peculiar to the class of reptiles we are considering is that of "*speckled*" or "*shining*," and thus the term may have been employed. I have heard, however, of another meaning, which has not been given in any of the dictionaries I have hitherto had an opportunity of consulting—namely, "anything diminutive," such, for example, as the smallest of a litter of pigs, of a clutch of chickens, &c. A gentleman well acquainted with the County of Waterford has assured me that the word is understood there in this sense, and so commonly applied to the land lizard. It will then mean "the diminutive thing among the rushes"—an interpretation by no means unreasonable. I confess, however, it does not appear to me quite satisfactory. I shall now briefly consider the remaining two names.

In the western parts of Cork, where I passed my earlier years, the lizard—object of terror to such as incautiously went to sleep in the open air—was never called by any other name than Eas-luachra—I mean by the Irish speaking portion of the inhabitants. The latter part of the compound has been already explained; the former part is the name usually given to the common Irish weazel. Now, it is generally known that analogy is the law of all languages in the process of formation. The first appellatives are believed to have been proper names. Gradually, as new objects presented themselves, the proper name was extended, according as the new objects presented more or less resemblance to those already furnished with appropriate designations. This law, it seems to me, would account for the extension of the term Eas—from an animal that usually accompanies man in his migrations to the less known and more rarely occurring "dweller among the rushes."

The only remaining Celtic name—Eascu—admits of a similar explanation. It is composed of two elements—Eas and Cu, the latter signifying a hound, and obviously akin to the Greek κυων and the Latin *canis*. In the two classic languages it is the generic word apparently, while in the Irish branch of the Celtic it is restricted properly to the variety "greyhound;" but sometimes employed to denote hounds in general. The first part of the compound, among other meanings, bears also that of "water." The two syllables will then signify the "waterhound," and the whole word forms the only name by which, in the South of Ireland, I have heard those ignorant of English call the common eel. The resemblance between the hound and the eel may appear fanciful; but still I think it does exist in a degree sufficient to warrant the extension of the same term to the slender and swift-moving inhabitant of the stream. I should be

inclined to account on the same principle for the name "Eascu-luachra," given in parts of Kerry to the common lizard. If so, the epithet will mean, the "eel of the rushes;" and if there be resemblance enough between the "hound" and the "eel" to justify the application of one name to both, I imagine the argument will hold good equally for the "eel" and the "lizard."

I have thus, I think, thrown some light on a subject obscure and difficult enough. Circumstances did not permit me to employ much time or research in its further investigation; but I hope I may be able to recur to it again, and explain, by means of the Celtic language, the popular English name of "Newt."

EXTRACTS FROM CAPTAIN M'CLINTOCK'S DIARY (PLATE IV).

Captain M'Clintock, R.N., read the following extracts from his diary, kept whilst he explored the Arctic regions in search of Sir John Franklin, illustrated by several preserved specimens of the animal and vegetable life of those parts:—

Started 4th April, 1853; temperature, 0°—Saw a herd of nine oxen, but they were too wild to allow our sportsmen within 200 or 300 yards.

6th April—Crossed Crooked Ravine; saw a herd of musk oxen, seven in number; were too wild to afford us a supply of fresh beef; also saw two birds, supposed to be ravens, and a few deer tracks.

16th April; temperature, 13°—Whilst upon the north shore, between the cart depot and Point Nias, the only animal seen was a hare, which Mr. De Bray shot, and the only tracks were those of deer and of a fox, which had mounted to the top of Parry's monument.

19th April; temperature, 4°—Saw a herd of 16 or 17 oxen moving slowly to the south-east, and two reindeer; crossed from Cape Fisher to the next point of land; here a dark, hard stone abounds, appearing to protude from out of the sandstone, and contains impressions of fossil corals. On the eastern side of this land Mr. De Bray found numerous small fragments of coal. About Cape Fisher the traces of oxen and deer were *very* numerous, although we saw scarcely any vegetation.

20th April; temperature, 16°—At 10 o'clock three oxen were seen near the beach, and a herd of 15 further off; stopped the sledges whilst Mr. De Bray and I went in chase of the former. I was fortunate enough to approach unseen, and to shoot a bull; although at our first appearance all three of them galloped away, the two survivors now stood resolutely facing us, and when the party came up to carry down the meat we were obliged to pelt them with stones to get them to move away; but once having commenced their retreat, they galloped off with most surprising speed up the hills for nearly two miles.

21st April; temperature, 8°—Whilst crossing a bay, and about a mile off the land, we passed four separate tracts of lemmings, travelling in for the land. If these little creatures are migrating across the ice, there would seem to be some land in the north-east or east.

22nd April; temperature, 1°—Rounded Flat Point; heard a ptarmigan call; encamped at noon, about ten miles from Long Point. Vegetation is more abundant here than we have found it since crossing Melvill's Island; traces of animals are very numerous, but not recent.

24th April; temperature, 11°—When passing Grassy Cape we saw a ptarmigan, and a herd of 18 reindeer: one deer had a single antler, the other 17 had none. On the south-eastern slope of the Cape there was more grass than was hitherto seen

25th April; temperature, 12°—Saw the track of one wolf and of two or three foxes.

29th April; temperature, 0°—Mr. De Bray saw three oxen and two ptarmigan.

30th April; temperature, 1°—Passed over the extreme of Sandy Point; found plenty of a stunted description of moss, but hardly any grass; saw a few fox tracks coming from the westward; also some lemming tracks; shot a brace of ptarmigan; saw the footprints of an ox; travelled for the extreme Bluff, Cape De Bray; passed three deer tracks, crossing the strait to the north-west, as also those of foxes, lemmings, and ptarmigans.

1st May; temperature, 5°—Found grass—saxifrages and poppy, but hardly any moss; saw several large lumps of gneiss; one very large one had the rounded form of a boulder, about 50 feet above the sea, six feet in diameter. The first snow-

buntings of the season were seen here; fox and ptarmigan tracks were very numerous, as also fresh wolf tracks, coming from the south-west.

3rd May; temperature, 4°—Saw twelve deer tracks; fox tracks very abundant.

5th May; temperature, 8°—Saw five deer coming towards us from the nearest point of Eglinton Island, one of which I was fortunate enough to kill at 190 yards.

6th May; temperature, 3°—Numerous deer tracks; Terrace Cape—found more vegetation here than I had expected, as these slopes are exposed to the north-west; saw several tracks of hares, which hitherto we have rarely met with; also a wolf track.

8th May—Encamped upon the south-west side of Ibbett Bay; shot a ptarmigan, and saw a raven; during the day the temperature rose to 20°.

9th May—Delightful weather; tufts of moss and the tops of stones are gradually peeping up through the snow, and animals begin to appear. I picked up two caterpillars to-day. Fox tracks are very numerous; the majority of these tracks are crossing to the north-westward, probably following the ptarmigan; lemmings are abundant, and these wonderful little creatures, which constitute the chief support of foxes, ravens, wolves, owls, and even every species of gull, are as active tourists as the larger animals, crossing these wide straits in all directions. Hare tracks are pretty common along the shore and upon the sides of steep hills; they make burrows under the snow; but we have never found them in the earth like those of the fox and lemming. No traces whatever of the polar bear have been met with, and only a few tracks of wolves coming from the southward. No traces of the musk ox upon the ice, or along shore; if they migrate at all, it must be only from the interior to some favourite slopes upon the coast.

14th May—Encamped half a mile from the beach; whilst the men were fetching on the second load I went on shore; found here plenty of moss, but scarcely a blade of grass; saw a herd of 11 reindeer, and had the good fortune to shoot three of them; on my sudden approach they ran off with great speed; but after reconnoitering me from a hill trotted briskly back, halting for a few seconds every now and then. In this way they approached within about seventy yards, when I shot two of them; subsequently they allowed me to approach near enough to shoot a third buck. Whether their natural curiosity prompted them to come towards me, or that they wished to drive me from their feeding ground, I cannot tell.

20th May; temperature, 28°—The first seal was seen upon the ice, near Double Streak Head. On examining the "seal hole" I saw that the water was fully three feet below the surface of the ice. On going down into the hole found a cavern large enough to contain two or three seals, and just above the water: this habitation was amongst hummocks, and seemed to be formed in the deep drift of snow collected about them; the roof, although strong enough to walk over, admitted sufficient light; the interior was coated with ice; and the numerous icicles afforded proof that the place was sufficiently warm before the hole to the surface (which seals always require to breathe through) was increased to its present dimensions. Snow falling thinly; we suffer great inconvenience from the heat; atmosphere excessively close.

21st May—Shot a hare and five ptarmigan; saw a few fragments of coal.

22nd May—At eleven o'clock we saw and shot two very large musk bulls; we found them in better condition than any we have ever seen. I shall never forget the death struggle of one of these noble bulls. A Spanish bull-fight gives no idea of it. This animal was shot through the lungs. As it stood fiercely watching us, prepared, yet unable to charge, its small, but fixed, glaring eyes were almost concealed by masses of shaggy hair, and its whole frame was fearfully convulsed with agony. The tremulous motion was communicated to its enormous covering of tangled wool and hair; even the coarse thick mane seemed to rise indignant, and slowly waved from side to side. It seemed as if the very fury of its passion was pent up within for one final—a revengeful charge. There was no roaring; the majestic beast was dumb; but the wild gleam of savage fire which shot from his eyes, and his menacing attitude, was far more terrible than the most hideous bellow. We watched in silence, for time was doing our work, nor did we venture to lower our guns until, his strength becoming exhausted, he reeled and fell. I have never witnessed such an intensity of rage, nor imagined for one moment that such an apparently stupid brute, under any circumstances of pain and passion, could have pre-

sented such a truly appalling spectacle. It is almost impossible to conceive a more terrific sight than that which was presented to us in the dying moment of this matchless monarch of these northern wilds. A mile or two farther on we saw four milch cows, and a very small calf.

30th May—There is more vegetation about Point Wilkie than we have yet seen on this side of the straits; saw a few ptarmigan.

1st June—Along the base of the Dark Cliff hills found moss and some grass; also abundant traces of oxen and deer; nothing seen, except two ptarmigan, which I shot, and a snow-bunting, whose cheerful song enlivened the dreary aspect of this frozen soil.

6th June—I walked for three or four miles, over to the hills, round the last bay; saw tracks of the fox, and a few deer; also burrows of lemmings; saw an ox in the distance, which allowed me to approach within 50 yards of him; he stood quietly, rubbing the tips of his massive horns against his fore legs; while I was examining my gun I heard his gallop, and saw him coming on; fired both barrels just in time to stop him when 10 or 15 yards off; having reloaded I fired again, and despatched him. It is wonderful how so large an animal could support life in such an extremely barren country.

13th June—At the extreme of the main land saw two ivory gulls; saw land, evidently an island; no traces of animals, nor any vegetation, except minute lichens on the stones.

14th June—None of these islands that we met with more than 60 feet high, and are entirely composed of gravel; on the beach were many bivalve and a few spiral shells; the colour and hinges of the former were still perfect; saw two nests of the ivory gull of a former season; they were chiefly made of moss, and there was much more of it used in their construction than I have seen growing upon the whole of these islands. The broken pieces of egg-shell that lay about were pale olive, with irregular dark brown blotches; small fish bones, and bones of lemmings were strewed about.

16th June—Saw two other small islands; we found here small pieces of gray gneiss, and on a little patch of earth I found the jaw bone of a seal, and a few very small pieces of much decayed wood.

19th June—On landing on one of these islands I was much surprised to find mud and clay, and still more so, on finding a good deal of moss, with some grass; saw six brent geese, the first of the season. This island appeared to be a favourite haunt of theirs; found some bones of a deer, and traces of the fox and lemming; several small spiders were crawling about, of a black colour.

20th June—Saw one glaucous and two ivory gulls.

21st June—Landed, and saw an ivory gull seated upon her nest, in a bare patch of gravel, near the earth; there was but one egg in it; the nest was exactly the same as those examined a few days ago; but in addition to the moss there was a little white down, and a few feathers in it; this nest had served for former years, as there were bleached bones of lemmings strewed about it. There were also fresh pellets, consisting of their bones and hair, proving that those little animals are preyed upon by these gulls; and until I had learned this fact in their natural history, was quite puzzled as to what they could subsist on at this season. Saxifraga oppositifolia grows here. We have not seen it to the northward. Four ivory gulls and a snow-bunting seen. A flock of geese were seen passing to the eastward.

22nd June—Caught a lemming; its brown summer coat was perfect.

24th June—Saw three king ducks, two long-tailed ducks, and two brent geese, flying to the north-west.

25th June—Great numbers of lemmings were seen; the men used to amuse themselves catching them.

On the 27th of June we reached Emerald Island (*vide* map), and encamped near the shore; and after a short rest proceeded back to our vessel.*

It was then moved by Rev. J. Carmichael, seconded by A. H. Haliday. Esq., and carried—"That the thanks of the Dublin University Zoological Association be given to Captain M'Clintock for his very interesting communication."

* The continuation of these extracts will appear in the July number of the Natural History Review.

DUBLIN NATURAL HISTORY SOCIETY.

ANNUAL GENERAL MEETING, NOVEMBER 23RD, 1856.

ROBERT CALDWELL, Esq., M.R.I.A., in the chair.

The minutes of the last preceding meeting and other preliminary business having been disposed of,

Mr. Andrews, honorary secretary, was called on for the annual report, which he proceeded to read as follows:—

"GENTLEMEN—We have again the pleasure of submitting to you the annual transactions of the Society, and to report its steady and favourable progress to this the seventeenth year of its proceedings. It has hitherto been invariably the practice to lay before the members abstracts in detail of the papers and discussions on the several branches of the natural sciences that had occupied each evening of the monthly meetings throughout the session; but these proceedings have been so very fully given in the journal of the 'Natural History Review,' which publication affords a secure record of such transactions, that it will only now be necessary to enumerate the subjects brought forward during the session of 1854-55:—'Notices of some rare Crustacea obtained on the West Coast'—communicated by Mr. Andrews, honorary secretary. 'On the Coleoptera infesting Granaries'—James Haughton, jun., Esq. 'On a digitate variety of Botrychium Lunaria, with observations on the forms of other ferns, noting a new Irish habitat of Lophodium Spinosum'—Dr. Kinahan. 'Remarks on the bones of animals, and of some extinct species, found in a crannog or fortified entrenchment, at Dunshaughlin'—communicated by Mr. Wakeman. 'On Pectunculus Glycymeris, and on the local range of Molluscous animals traced with the dredge'—Dr. Farran. 'Remarks on the soundings off the south-west coast, and on an addition to the Fauna of Ireland, "Eunice tubicola"'—Mr. Andrews. 'On a very fine specimen of the head and horns of the red deer, taken from an excavation in the bed of the river Boyne'—communicated by Mr. Trouton, of Drogheda. 'Remarks on the Serrani and Percidæ, and on an addition to the ichthyology of Ireland, "Polyprion Cernium"'—Mr. Andrews. 'On the capture of Larus Islandicus, at Kenmare,' by Dr. George Gray Creighton. 'Notes on the Ornithology of the south-west coast, and on the occurrence of the greater shearwater, Puffinus major; with remarks on the characteristics of Larus Bonapartii and Larus ridibundus'—Mr. Andrews. 'On Ianthina communis, collected with other mollusca on the west coast, with notes on the peculiar habits of Ianthina'—Mr. Hopkins. 'Continuation of Mr. Wakeman's paper on the remains of animals, war implements, &c., found at Dunshaughlin.' 'On the habits and varieties of some of the Laridæ, and of the characters of Irish specimens of Larus ridibundus,' by Mr. Watters. 'On the advantage to botany of local lists and notes with reference to the algæ of the east coast of Ireland'—Gilbert Sanders, Esq. 'Remarks on some rare algæ, south-west coast'—Mr. Andrews. 'On the effects of the severe frost of the winter of 1855 on plants in the neighbourhood of Sligo,' by the Right Hon. John Wynne. 'Remarks on the plantations of the Hazlewood Estate, Sligo; and on pines and trees best calculated for exposed plantations'—Mr. Andrews. 'Notices on the par and on the salmon fry, and on the result of the experiments at the Stormontfield ponds, banks of the Tay'—Mr. Andrews. 'Records of the breeding of the Scaup duck in Kerry, and on the occurrence in inland lakes in the summer months of the red-breasted Merganser M. serrator, and of the recent occurrences in several localities of the turtle dove—Columba turtur.' These formed the principal features of the proceedings of the past session. Some donations of interest have been added to the collection, the chief being specimens of the Crustacea, from the Dublin coast, and from the west coast of Ireland, presented by Dr. Kinahan and Mr. Andrews; and also by the latter, a well-preserved specimen of the Porbeagle shark—Lamna cornubica, captured in Dingle Bay. The Iceland gull, Larus Islandicus, handsome specimens of the hawfinch, Coccothraustes vulgaris, and the mountain finch, Emberiza montium, have also been presented by Dr. Harvey, of Cork, and Messrs. Williams and Dombrain; and some very fine specimens of Ianthina, collected on the west

coast by Mr. Hopkins. A sub-committee in the several branches of zoology having recently been formed, the society is now in a better position to receive and to arrange in the museum any donations that may be forwarded, the collection being altogether confined to objects of the Natural History of Ireland. The members added to the society during the past year have more than equalled any withdrawals or losses the society may have sustained, and the ballot of this evening will denote the vigour with which the society is about to enter upon another session. A principal feature in the business of the society has been the union of the late Microscopical Society. Some time since arrangements for the union of the two societies were drawn out, which received the assent of the principal members of the Microscopical Society. The microscope, books, and the accounts of that society have now been transferred, and a sub-committee of practical men in microscopic manipulation nominated. It is thus anticipated that an interesting field of research is open to the members of the society, especially in cryptogamic botany, in the examination of vegetable and animal tissues, and in minute organisms. By this union, members of the late Microscopical Society are placed upon the same terms, without ballot, as the annual members of this society. To increase further the interest of the society, it has been strongly advocated by many of the members that the proceedings of the society should assume a more popular style, and a more general admission of visitors be allowed. It is, therefore, submitted for your approval, that a limited number of evenings throughout the session be named for that purpose, apart from the usual scientific meetings, and that to these meetings the families of the members and their friends be admitted, according to the arrangements that may be proposed by the committee who have been appointed to consider and to report upon the practicability of carrying out these views. The subjects proposed are "Zoophytes and algæ," "on marine, and land and fresh-water shells," "on ferns, their habit and culture."

On being moved by Dr. Gordon, seconded by Mr. G. Sanders, the above report was unanimously adopted; and it was arranged that a committee should be appointed to carry out the recommendation of the council with reference to holding meetings of a popular character during the session, apart from the ordinary meetings of the institution.

Mr. R. P. Williams, treasurer, then submitted his statement, showing a balance of £20 18s. 10d. to be added to the reserve fund, making a gross balance of £60 18s. 10d. over all expenses. The society had existed for seventeen years, during which time it had overcome many difficulties. By the exertions of its members it had been kept alive in the time of the famine, and it was now beginning to return to a state of prosperity. They had lately taken the handsome and capacious rooms in which they were then assembled, and he believed that, with a little exertion on the part of the fifty-five members who belonged to it, they would shortly have an income of about £200 a year, with which they would be enabled to extend their sphere of usefulness in no inconsiderable degree. Nine new members would be proposed on that night, which was an evidence that an effort was now making in this direction.

The following gentlemen were elected as the council of the society for the ensuing year:—Sir Edward Borough, Bt., M.R.I.A.; Thomas F. Bergin, M.R.I.A.; F. W. Brady; Ch. Croker, M.D., M.R.I.A.; J. R. Dombrain; Chas. Farran, M.D.; Samuel Gordon, M.D., M.R.I.A.; W. H. Harvey, M.D., M.R.I.A.; Robert John Montgomery; James Edw. Stopford, LL.D.; R. P. Williams, M.R.I.A.; Gilbert Sanders, M.R.I.A.; The Lord Talbot de Malahide; John Aldridge, M.D., M.R.I.A.; Joseph Todhunter; Robert Barklie. Treasurer: Robert Calwell, Esq., M.R.I.A. Secretaries: Wm. Andrews, M.R.I.A.; J. R. Kinahan, M.B.

A ballot was then opened, and the following were elected members of the Society:—

Associate Members—Messrs. Ryland Byrne and Daniel Sutherland, Royal Sappers and Miners.

General Members—Dr. William Stokes, 5, Merrion-square, North; Colonel Gough, C.B.; Rev. Samuel Haughton, F.T.C.D.; Dr. Corbett, Professor of Anatomy, &c., Cork; James E. Millar, Esq.; Dr. Cathcart Lees.

Dr. Smith, 63, Eccles-street, has re-joined as a member; and George Yeates, Esq., Grafton-street, as a member of the late Microscopical Society.

The meeting was then adjourned.

DECEMBER 14, 1855.

JAMES R. DOMBRAIN, Esq., in the Chair.

The minutes of the previous meeting having been read and signed, Mr. Andrews, Honorary Secretary, stated that he had that day received a letter from his brother secretary, Dr. Kinahan, dated Callao Roads, Peru, detailing many interesting observations he had made. He hoped to be present at the meeting of the Society in February next.

Mr. Andrews then gave a few observations on some of the rarer Fungi of Ireland, which, he stated, were to be looked on as merely preliminary to fuller details, which he hoped to lay before them at the next meeting. They had reference to species collected by him during a short autumnal trip in the South-west of Ireland, principally belonging to the genera Polyporus and Boletus, Mr. Andrews entering on many interesting details concerning the scenery of the district.

Observations on these notes were made by Doctor Stokes, Rev. Professor Haughton, and Professor R. W. Smith, principally with reference to the lichens of the districts described.

Mr. Andrews stated that the arrangements with reference to the popular meetings were nearly completed. Three should take place during the ensuing session, but the full arrangement would be submitted to the members for their approval at the next night's meeting.

After ballot, the Chairman declared J. K. Barton, Esq., M.B., T.C.D., Dublin, duly elected as ordinary member.

The meeting then adjourned to the month of January, 1856.

JANUARY 11, 1856.

SAMUEL GORDON, Esq., M.D., M.R.I.A., in the Chair.

The minutes and other preliminary business having been disposed of, Mr. Andrews, Honorary Secretary, announced the following donations:—From George Annesley Pollock, Esq. M.D.N.H. Soc., a beautiful specimen of the Alpine Hare (Lepus Variabilis), perfectly black, shot at Bailieborough, County Cavan. From S. Gordon, Esq., M.D., the four numbers of the Journal of Microscopical Science for the year 1855.

The thanks of the Society having been voted for these valuable donations, the Chairman said, that with reference to the announcement made at the last meeting on the subject of the popular meetings, and of the arrangement proposed by the committee, he wished to learn whether the members had any proposition or suggestion to make in reference to the more fully carrying out of the proposals of the Council, in order that such proposition might receive the sanction of the members.

Doctor Owens proposed the following resolution, which was seconded by Doctor Lees, and unanimously carried:—

"That the Council having reported to the Society that it is advisable to have certain Meetings (not connected with the ordinary business of the Society), to which Ladies should be admissable, and at which Papers on Popular Subjects should be read and discussed: that the recommendation of the Council be adopted, and that the Treasurer be hereby empowered to call on each Member for an additional Subscription of 3s. 6d., it being understood that each Member is entitled to receive two tickets of admission for 1s. each. And that the Council be requested to complete their arrangements, so as to have the first of these Meetings as early as possible in the ensuing month."

This resolution was accordingly ordered to be entered on the minutes, and a copy of it to be sent to each member.

Mr. Andrews then read his paper.

REMARKS ON THE FUNGI OF THE SOUTH-WEST OF IRELAND.

It has long been a matter of surprise to me, while the temperature and humidity of the wooded districts in several portions of this country afford such extensive

investigations of interest throughout the seasons to the Cryptogamic botanist, that but little attention has been paid to a tribe of plants remarkable for their extraordinary development, their beauty and vividness of colouring, their seasonal reproduction, their local influences of growth, and the organization of forms constantly peculiar to certain decaying vegetable bodies. Such are the Fungi or Fungal family, cellular flowerless plants, propagated or reproduced by spores, chiefly growing upon decayed organic substances, or developed from decomposed material. Although much interested in the study of mycology, I shall not at present enter into remarks on the organography or physiology of the subject, until observations that I have been noting are more complete. I have long considered that these inquiries might lead to successful results, by the adaptation of a suitable and favourable *locale*, where a state of atmospheric influence necessary for the development of the more sensitive forms of our Cryptogamic plants, which are brought forth only in the moist, warm, and still atmosphere of the primeval woods of the south-west of this country, might be gained. I have satisfactorily succeeded in carrying out these views in a Fernery, which I have lately completed, where a proper aspect, subdued light and temperature accomplish all that can be desired for the encouragement of healthy growth and perfect development. Many of our more rare lichens, mosses, and jungermaniæ have even in the most favourable localities never been known to fruit in the British Isles; yet, still, I am in hopes of tracing some facts of interest in their development, as well as in the tribe of plants that I am about to submit to you this evening. You are aware of the extreme interest excited by the study of the Vivarium, where the habits and progression of animals can now be scanned, whose ways were previously hidden in the deeps of the ocean. The fernery presents the same interest to the Cryptogamic botanist.

So far back as the month of April, 1844, I recorded in this society the discovery of the Morell, Morchella esculenta, by Simon Foot, Esq., in the pine woods at Hollypark, and at the Little Dargle, and at the time alluded to the state of our knowledge of the fungi of this country. Since then but little has been brought forward new in that branch of study. Although I have noted a large number of the fungi that are prevalent chiefly in the woods of the south-west of Ireland, yet I shall only now bring forward the record of one of some interest, and allude to a few of the more remarkable that I have obtained. The specimens, among others, that I shall submit to you this evening are the different stages of growth of the Birch-tree Polyporus, Polyporus betulinus, which I do not find to have been hitherto recorded in any of the notices on that section of the botany of this country. This fine and handsome species is of annual growth, assuming a rapid and large development in the autumn months on the decaying trunk of the birch-tree. It is met with in the more secluded parts of Torc and Cromaglouin woods, in the neighbourhood of Killarney, where, on the huge trunk of a fallen birch-tree, I obtained specimens measuring more than two feet across. The pileus is a pale reddish brown, or deep fawn colour, occasionally spotted with a darker brown—flesh very thick and white—hymenium of the same substance as the pileus, and not separated from it. The fungus is attached to the tree vertically by a short, thick, rather sessile stipes. The pileus is suberose or corky, extremely fleshy in the recent state, but of a dry and fibrous nature when preserved, and in this respect resembles Polyporus fomentarius, a species remarkable for making amadou, and which fungus is also found growing on the birch in Cromaglouin wood. The Polyporus betulinus is considered of rather local occurrence both in England and Scotland, as well as another species of interest that I have obtained on the branches of the birch, Stromatosphæria elliptica. The Polyporus fomentarius, or real amadou, is distributed in every region of the globe; and although met with on oak, yet is most generally seen on the birch, the species in the tropics being identical with those of the temperate zones. This distribution and attachment to peculiar trees is strikingly seen in the genus Cyttaria, which is peculiar to the beech in Terra del Fuego, and used there as an article of food—the same fungus is found on beech trees in Chili, and also on similar trees in Van Dieman's Land. Of the other species of Polypori, P. squamosus, the largest of British fungi, and which attains an enormous growth in the space of a few weeks, is met with in one of the wooded glens near the tunnel, growing on the fallen trunks of the ash and the birch. In this fungus, as

well as in several of the boleti, the reproduction and cicatrising of displaced and wounded parts are very surprising.

In the month of September, in Cromaglouin wood, I noticed the beauty of Polyporus lucidus, as it grew in ranges along the trunk of a large ash, which, in a dell of most luxuriant vegetation, had fallen and rested on huge boulders of rock. Here, amid a mass of vegetation of the liveliest green, and where the dense foliage overhead shaded and preserved a moist and warm temperature, the bright chesnut-coloured pileus of Polyporus lucidus appeared strikingly beautiful. It was, indeed, a spot genial to fungus vegetation, and reminded me of those primeval forests of the tropics which humidity never abandons, and which the arches of foliage rarely permit a ray of the sun to penetrate. It is of much interest to watch the development of fungi, agamous plants without epidermis, and consequently destitute of stomata—their reproduction is singular and rapid. I had placed a fine specimen of Dædalia biennis in my fernery on the spreading mass of a lichen (Placodium plumbeum), and I was surprised in a few weeks to find that a plant of Dædalia had formed upon the lichen. This Dædalia is very beautiful, and richly marked with concentric zones; the hymenium is large and fleshy, of a pinkish red tinge, and wavy or sinuous. The Dædalia quercina, which is a more common species, is of a delicately fibrous texture, and when cut into slices has been used as a styptic. Some time since I submitted to the society large masses of Racodium cellare, mouse-skin byssus, which grew in quantities on claret casks that had long been stored in the Custom-house dock vaults. It especially formed and grew where the claret had leaked from the cask. This fungus is most valuable as a styptic. So suitable is the fernery to such vegetation that a beautiful species of Xylaria, Agaricus tuberosus, annually appears among Hymenophyllum and Trichomanes, and on a piece of oak wood Peziza æruginosa displays its cup-shaped or turbinate pileus of a most beautiful verdigris green, which colour penetrates and stains deeply the wood.

I shall only briefly mention a few others, as I propose drawing out a detailed list; among them several are extremely beautiful, as microscopic objects. Agaricus floccosus, a pretty species on the stump of an ash tree, Cromaglouin; Boletus luridus, and Amanita muscaria, both beautiful, but extremely poisonous, near the road side, leading to the tunnel; Clavaria cinerea, C. fragilis, and C. coralloides, frequent on Torc mountain, especially along the deer paths. These are considered delicious esculents, as also Hydnum repandum, which is abundant in Muckross wood, and of large size. Its odour is like the common mushroom, but of very pungent taste before cooked. Hydnum imbricatum also occurs, but not so frequent as the other. In the woods of Muckross, bordering the lake, I met fine specimens of Agaricus gilvus and A. comatus. In the same wood also occurred Phallus impudicus, remarkable for its offensive odour. In the low grounds occurred Cantharellus cibarius, a good esculent, and on several fallen trees Tremella ferruginea and T. intumescens, growing in large gelatinous masses. It is singular the force of expansion that these soft and gelatinous fungi possess in their growth, rupturing the hardest epidermis of the trees upon which they are parasitic. I have seen the Tremella mesenterica, which is frequent on the furze, bursting through the tough bark even of the living branches. This beautiful species is of a rich orange colour and of a soft texture.

Mr. Andrews exhibited very large and fine specimens of Polyporus betulinus from the earliest stage of growth to full development, and beautiful specimens of Dædalia biennis from Torc Wood, Killarney.

Dr. Stokes asked how these fungi were reproduced beneath the bark.

Mr. Andrews said that in the decaying state of the mature fungus, the sporules scattered on the substance of attachment, and might probably be absorbed, and the mycelia form beneath the epidermis. The same species of fungus were often annually produced upon the same tree.

Professor R. W. Smith then read a paper on Enterolithes, in which he entered very fully into the subject of Enterolithes, or the peculiar concretions found in the bodies of animals. He explained their growth and effect in animal life, and exhibited specimens of these concretions found in the horse, cow, and other animals. He also explained the origin of the term Bezoar, and the peculiar characters of the

masses so termed, as found in the horse, monkey, goat, gazelle, and other animals, and even in man himself.

After some discussion, the ballot opened, at the conclusion of which the Chairman declared the following duly elected ordinary members:—Glascott Symes, Bonnybrook, Artane; J. Nalty, Esq. M.D., Dublin; Rev. Eugene O'Meara, Dublin.

The meeting was then adjourned to the second Friday in February.

FEBRUARY 8, 1856.

CHARLES P. CROKER, Esq., M.D., M.R.I.A., in the Chair.

The minutes of the previous meeting having been read and signed,

Dr. Farran read the following paper

ON THE GENUS SKUA. (LESTRIDÆ.)

I am not so vain as to suppose I can add anything very new in the observations I am about to make on the very interesting and well-defined genus Lestris or Skua, which has been so very ably commented on by the most eminent ornithologists of the day, both by plates and description; nevertheless, I think I would not be fulfilling my duty as a member of the Natural History Society, if possessing, as I do, the means of exhibiting in one view four out of five members of the European family, I neglected the opportunity—besides, three specimens possess the intrinsic interest of being the originals from which the late Mr. Thompson drew up his description of the species in his beautiful and interesting work on the birds of Ireland; and I trust I shall be able to show presently that the remaining specimens are not void of interest. I anticipate this further advantage—of drawing the attention of those whose residence may be in the vicinity of the sea, or of those who occupy their business on the great waters, to the habits of this singular family. I have bestowed some attention on the modes of capturing the prey pursued in the several departments of the animal kingdom, and I find that it is procured by direct assault or attack. Thus, the lion and all the feline tribe spring on their prey and devour it. The eagle and its congeners pounce on their victims—the gentle swallow captures its insect food directly, aided by the celerity of its flight and the rapidity of its evolutions—the spider, having entangled its prey in its web, darts on it and destroys it; in fact, throughout the course of nature it may be laid down that direct assault is the mode by which sustenance is obtained. But there is no rule without an exception, and this genus may be cited as forming the exception. Its habits will explain this more fully. It attends the gulls and terns, and quietly consorts with them, never attempting to injure them when reposing on the water; but no sooner do they perceive an individual has succeeded in taking a fish or any other variety of food, than it is immediately singled out by the attendant Skua, who most violently assails it, and, being of quicker and more powerful flight, soon overtakes the gull and compels it to eject the contents of its stomach, which is at once caught by the Skua before it reaches the water; or, should there be more than one fish or morsel, he leisurely picks them up in the water, where he remains until another unfortunate gull is brought under his iron rule. It was this habit that suggested to Temminck the name of Lestris, robber or pirate, when he constituted the well-defined genus Lestris; and has also obtained for each member of the family the euphonious epithet of dirt-bird or dungeater. The genus Lestris consists of five species, and in giving a description of one, it will equally apply to all. They are arranged in the following order:—*Lestris cataractes*, the largest; *Lestris pomarinus*, next in size; *Lestris Richardsonii* follows; then *Lestris Buffonii*, otherwise *Lestris parasiticus*, or Arctic skua; and the list is completed by the Lestris described by Dr. Richardson under the name *Stercorarius cepphus*, which has not as yet been found in England. The generic characters, as given by Yarrell, run thus:—Bill strong, hard, cylindrical, compressed, curved, and hooked at the point; bone of the upper mandible covered with a cere; nostrils situated towards the point of the beak, diagonal, narrow, closed behind, pervious; legs strong, naked above the tarsi, which are rather long; three toes in front palmated, the hind toe small; claws large, strong, very much curved; tail slightly rounded, the two middle feathers generally elongated, sometimes considerably;

wings moderate, the first quill feather the longest. To this may be added an indomitable and fierce courage, which gives them the complete mastery over the gulls and terns. They inhabit the higher degrees of latitude in both hemispheres, where they are more common than in the warm or temperate parts of the globe. It is unnecessary on this occasion to go more minutely into description; I shall detail the following incidents, which I witnessed, and which will exhibit the habits and instinct of Lestris cataractes:—In the middle of September, some five or six years ago, when examining the lofty cliffs in the vicinity of Stradbally, county Waterford, the day being remarkably fine and warm, not a breath of wind stirring, the sea like a sheet of glass, my attention was drawn to an immense flock of the herring gull floating on the smooth water; their shadows reflected so as to deceive the eye, making each bird appear double. This flock was an object of great interest to a number of fishermen, who mentioned to me that the gulls appearing in that manner indicated the advent either of the herring or the sprat. Such a perfect picture of repose I have seldom witnessed, and I was about to pursue my ramble, when suddenly the entire flock of gulls rose with a confused sound of screeching and screaming which literally filled the air with a noise it would be impossible to describe. To this was added a rapid whirling and turning, which strongly reminded me of a swarm of bees when emerging from the hive. The men at once observed that the fish had arrived, and immediately left to prepare their nets. However, on gazing some time longer on the evolutions of the birds, I distinctly saw a large dark bird pursuing a gull, which it hunted through the mazes of the screaming flock with as much pertinacity and skill as a well-trained hound would follow its game, but all to no purpose. Presently the gull separated from the flock and made towards the spot I was standing on; but its relentless pursuer was not to be baffled; increasing its speed and making a quick and sharp turn, it struck the gull fiercely and pulled out a quantity of feathers; on the moment the gull ejected two or three small fish, which the Skua at once caught. The gull then winged its way back to the flock, the Skua quietly following, and soon both were again reposing as quietly as before, the entire flock settling down as if nothing had happened. On another occasion (the beginning of last year), during a severe gale, I went down to Kingstown to see the effect of the very heavy sea which broke over the eastern pier. A large flock of gulls had congregated immediately next the pier, where it strikes into the sea from the shore. The gulls were busily engaged in the capture of the fry of the conger eel, which had been disturbed by the violence of the waves from their hiding places. The fry appeared to be very plentiful, and were about twelve inches in length. However busy the poor gulls were there was an attendant on them (Skua cataractes) far more industrious; for no sooner had he perceived that a gull had taken an eel than he was immediately attacked and compelled to relinquish his game; and, however it might be regretted that the legitimate captor was deprived of his prey, still there was an ample recompense in viewing the graceful manner of the Skua when taking the fallen fish from the crest of the wave. This bird is a great favourite in the higher latitudes, being hailed with delight by the inhabitants of the Shetland Islands as being the forerunner of the advent of fish, and being the protector of their lambs from the eagle, which bird they attack with surprising courage whenever they approach their breeding grounds, and drive them off. I now draw your attention to the Pomarine Skua (Lestris pomarinus), which is noticed by Mr. Thompson "as of occasional occurrence in autumn and winter on various parts of the coast of Ireland—it is next in size to the cataractes, partakes in the general habits of it and the other species of the genus;" preferring a life of plunder to one of independent industry. There is but one record of the bird being obtained in adult plumage, and that was in Ireland. It was the first in this plumage noticed within the British Isles; neither does it breed in the British Isles. The name of Skua is considered to have been adopted from the note of this bird, which sounds like "skui." Bewick appears not to have been acquainted with this bird, as he does not notice it in his work. Altogether it is the rarest of the Skuas which visit our coasts. Richardson's Skua (Lestris Richardsonii) next occupies our attention. It is noticed by Mr. Thompson "as occasionally procured on the coast;" and the specimen before you, shot at Malahide on the 27th September, 1837, is the bird from which Mr. Thompson drew up his description. The bird appears to me to be in immature plumage

although nearly approaching maturity; and I infer this—differing from Mr. Thompson, who says that the bird is mature—by stating, that when it is approaching to that stage a few yellow hair-like streaks appear on the sides of the neck, next the sides of the neck all round become white tinged with yellow, the head remaining the same colour as the back. This bird appears, like the last mentioned, to be unknown to Bewick, as it is not recorded in his work. I shall not for the present attempt to offer any further observation on this bird, as a difficulty arises as to whether those two specimens to which I now point are the young of Richardson's or the long-tailed Skua; and as the question appears to involve some difficulty I shall first advert to the long-tailed Skua (Lestris parasiticus). Arctic Skua, or Lestris Buffonii, Buffon's Skua, is noticed by Mr. Thompson "as of occasional occurrence in autumn on some parts of the coast;" and in a communication made to the Zoological Society of London by that lamented gentleman, it was remarked that specimens of the true Lestris parasiticus Temminck have repeatedly occurred in the bays of Belfast and Dublin, and he was induced to mention the circumstance from so very little being known of the bird as a British species. And this was truly surprising, for the true Arctic Skua is altogether one of the most elegant of our sea birds —light and handsome in its form, delicate in the colours of its plumage, and free and graceful in its motion. It is one of those birds the rareness of which is a matter of regret. There is no difficulty with adult birds in distinguishing the difference in species. Here you have Richardson's Skua nearly adult, and we are indebted to Professor Melville, Queen's College, Galway, for the pleasure we enjoy in viewing the fine specimens of the adult Arctic Skua. Professor Melville, aware that I required the bird to illustrate this evening's paper, in the true spirit of a naturalist and kindness of a friend forwarded it to me. The bird he obtained some time previously, in the bay of Galway. But if there is no great difficulty in distinguishing species when adult, such is not the case with immature birds, and more particularly with the two species just under consideration; and this brings me to a point I wished to have touched on in the early part of my paper—namely, whether those two specimens owe their parentage to Richardson's or the long-tailed Skua. The history of those birds may tend to elucidate the truth. Towards the latter end of September I was favoured by Mr. Ness, of Booterstown, with this bird, which he obtained some distance from the shore. I sent it to Mrs. Baker to preserve. Shortly after a specimen identical with it was forwarded from some part of the west coast of Ireland for Dr. Harvey, of Cork, to the same taxidermist; and about a fortnight afterwards I was favoured by Mr. Ness presenting me with another bird of the same species, which is now on the table. I examined those birds most minutely, and I confess great difficulties presented themselves in determining whether they belonged to Richardson's or the Arctic Skua; but these were partly removed by looking into the work of Bewick. You may remember I stated that Bewick was not acquainted with either the Pomarine or Richardson's Skua, but he gives two excellent plates, one of the Arctic, the other the black-toed Lobbe, dung-bird or boatswain, and young Arctic gull, and in giving a description of the bird, he observes—"This bird, which was formerly arranged as a distinct species," and a little further on he adds—"The toes black, the webs are of the same colour, excepting a small space between the first joint of the toes, which is white." Examine those birds and you will find that they are exactly represented by his description; on the contrary, it would seem both from the descriptions and plates in Mr. Yarrell's work that he would make them the young of Richardson's Skua; but we have another witness of no mean authority in Mr. Thompson, who would place the parentage to the Arctic or long-tailed Skua, and most fortunately he has left us his opinion inscribed on more than one specimen, which places them, if we are to confide in his opinion, authoritatively as such. In writing on this species, he says—"To myself this is the best known species of the Lestris, and it was the first to come under my observation both in Belfast and Dublin." He proceeds, and informs us that in the "Penny Journal" of March 9, 1833, a bird of an unknown kind was described and figured; being in Dublin I went to see the specimen, which was in the collection of Mr. Massey, of the Pigeon House Fort, and found it to be an immature long-tailed Skua. That bird passed into the possession of Mr. Waters, in whose collection it now is. I have compared mine with it, and I find them identical. He

mentions in another place a bird shot at Tramore, county Waterford, now in the collection of T. W. Warren, Esq.; and in comparing it with my specimens, I find them identical, save in respect of plumage; but, as if to increase the difficulty in discrimination, Mr. Thompson, in a note, remarks that Bewick's black-toed gull is Lestris Richardsonii; but its plumage, and that only is mentioned in the manuscript, (no dimensions being given), will serve for the immature Lestris parasiticus almost as well. Among such conflicting statements of eminent men, little weight should be attached to any opinion of mine; were I to give it, I would say they are the young of the long-tailed Skua—from the fact of their identity with those specimens named by Mr. Thompson; from their being apparently the more plentiful species; from their being obtained from nearly the same locality on the eastern coast; and from the fact of the adult long-tailed Skua being found on the western coast, and an immature specimen occurring shortly after in the same quarter: still, being aware of the fallibility of human judgment, I would be unwilling to mark them as such in a public collection. I shall now close by quoting a paragraph from Mr. Thompson's summary of the genus Lestris—"Without the presence of gulls or terns which the Skua makes his caterer—they are not to be seen unless accidentally. Although we cannot admire their predatory character, they are very interesting birds, from the great power and rapidity of flight which they display. As they come sweeping down on the large gulls it is extraordinary to observe these drop their prey, which, apparently, with the next second of time, is appropriated by the robber Skua. These birds present a singular subject for contemplation in being 'born robbers,' endowed by nature with every faculty that will enable them to bear off and live upon booty seized from or dropped through fear by their most nearly allied species, the gulls and terns." There are three beautiful specimens in the Society's Museum of Richardson's Skua, and one of the Pomarine. I need not refer to the fifth species, Stercorarius ceppus of Leach, as it has not yet, as far as my information extends, been found in Great Britain.

Mr. Andrews said that the thanks of the society were due to Dr. Farran for bringing before the meeting this evening such a fine series of the British species of the genus Skua, and especially for obtaining, through the kindness of Dr. Melville, of Galway, the exceedingly beautiful specimens of the mature bird of the rare species parasiticus. He had no doubt, from the characters shown by one of the specimens in the immature state, which Dr. Farran had lately obtained, that it was the young state of L. parasiticus. There were great differences of opinion as to the true characteristics of L. parasiticus. The specimen before the meeting clearly agreed with the description of Lestris Buffonii, Boié—bill straight, notched; middle tail feathers long and gradually tapering; tarsus almost smooth. L. parasiticus Boié—bill straight, broad at base, entire; middle tail feathers very long, and carry the breadth to within one inch and a-half of the termination, where they are abruptly narrow, and become slender and acute at the point; inhabits the Arctic Seas; exceedingly rare on the shores of North America and Europe, the young being only occasionally seen in the more temperate parts. It was remarkable that the young, or immature state of several of our rare Pelagic birds had annually been met with on the western coasts of Ireland, while the mature birds which frequented more northern latitudes were rarely seen. The several species of the Skua breed in the Faroe Islands, and while the old or mature birds seldom came more southerly, the young birds wandered extensively, particularly to more temperature shores; hence the immature state of those birds being of more frequent occurrence. The L. cataractes was the most powerful of this family, and most generally kept at a distance from the land. Off the Blasket Islands I have observed those birds in pairs, where they are the terror of the sea-gull tribe, and even the sea-eagle shuns their persecuting attacks. The fishermen observed to me that they had seen the fierce and intrepid peregrine falcon, which breeds on the Tiraght rock, put these birds to flight.

Doctor Kinahan confirmed the observations made by Mr. Andrews as to the more extensive migrations of young than old birds. It appeared as though the young birds were not so well fitted for enduring the severity of the winter. He instanced some remarkable examples which came under his observation during his recent voyage, bearing out those views, especially in reference to the various species of Albatross, off Cape Horn, and in the southern latitudes.

Doctor Smith gave a clear detail of a malignant form of disease affecting the meta-carpus of the red deer, and which probably caused the death of the animal, as seen in a bone from Kerry, presented to him by William Andrews, Esq. This peculiar disease affected the articulated extremities of bones, causing the expansion of the bone into a large kind of tumour.

Mr. James Haughton wished to record the occurrence of the common Bittern, Botaurus stellaris, in the County of Kildare and Queen's County. One was shot in Dunmanway bog, near Mageney, by Mr. Moore, of the railway station, during the severe frost in the beginning of January, and who saw another in the same locality. Another was shot at in Ballyteigue bog, Queen's County. It is of interest to record these birds in the country, as, from drainage and reclamation of lands, they are becoming almost extinct in their haunts.

Mr. O'Reilly exhibited branches of the hawthorn, having peculiar excrescences on the young shoots. The general opinions offered were, that they were the production of an insect, and not caused by fungoid growth.

After ballot, the Reverend Joseph Galbraith, F.T.C.D., and Doctor Frazer, Dublin, were declared elected ordinary members.

The meeting then adjourned till the month of March.

MARCH 14, 1856.

R. Callwell, Esq., M.R.I.A., in the Chair.

The minutes of the preceding meeting having been read and signed,

Mr. Andrews, Honorary Secretary, rose and said that it gave him much pleasure to have to submit to the Society an interesting communication from one of their members, Lord Clermont, accompanied by a valuable donation of birds for the Museum of the Society, viz., a fine male specimen of the Egyptian goose (Ch. Ægyptiacus), shot in Belfast Lough in 1853, being one of a flock of these birds seemingly in a wild state; a fine specimen of the black-tailed godwit (Limosa melanura), and also of the male golden-eye in full plumage, obtained from Loughgill, Sligo, in 1850. Mr. Andrews then read the accompanying communication as follows:—

"Birds observed near Ravensdale Park, during the last 18 months—Peregrine Falcon (Falco Peregrinus). A fine female shot near Armagh, in a populous district, October, 1855.

Spotted Flycatcher, Muscicapa Griseola. One pair breed yearly near Ravensdale village, Louth.

Mountain Finch, Fringilla Montifringilla. Five were killed in the neighbourhood of Ravensdale Park, February, 1855.

Rose coloured Pastor (Pastor Roseus). One in full plumage was shot near Carrickmacross, Monaghan, in a garden, August, 1855.

Bittern, Butor Stellaris. One shot near Carrickmacross, Monaghan, Nov., 1854. One near Clermont Park, Louth, February, 1856.

Night Heron (Nycticorax Europæus). One shot by a countryman at Inniskeen, Monaghan, January 16, 1855. I saw it the day after; it was in immature plumage, it rose from a marsh.

Black tailed Godwit (Limosa Melanura). One shot near Dundalk, Oct., 1855.

Long tailed Duck (Harelda Glacialis). A male bird in good plumage, caught on a fishing line at Lurgan Green, Louth, in March, 1855.

Smew (Mergus Albellus). A female shot near Carrickmacross, Dec., 1854.

I have seen in every case the birds which the foregoing list mentions as having been obtained at Clermont."

The Chairman said that the Society was much indebted for the donations that Lord Clermont had presented, and particularly for the interesting records of the birds occurring in his neighbourhood. He hoped that his lordship's example would be followed by others, not only in this, but with reference to the occurrences of rare animals in other branches of natural history.

Mr. Andrews then begged to present from himself a specimen of the greater shearwater (Puffinus major), captured on a fisherman's line off the coast of Kerry.

Mr. J. R. Dombrain presented, on behalf of his brother, Edward Dombrain, Esq., of Ballycullen, county Wicklow, two specimens of the blackcap warbler (C. atricapilla); the one shot in that neighbourhood, in October, 1855, the other in January, 1856, rendering it probable that the latter specimen had wintered in the country. Also, three specimens of the brambling (F. montium), shot in the same place during the summer of 1854, and a male and two female crossbills (L. curvirostra), shot by Charles Y. West, Esq., in Ovoca valley, in the same county.

The marked thanks of the society were voted to Lord Clermont, Mr. Andrews, and Mr. E. Dombrain, for these valuable additions to the Society's collection.

The Chairman then called on Mr. Andrews for his paper on Madeiran forms of ferns at Killarney.

Mr. Andrews said that in his review of the botany or zoology of a country or district he had always been desirous of tracing affinities and geographical distribution, and the identity of animals or plants in different countries. He had already brought before the Society the occurrence in Kerry of some of the plants of Cornwall, and numerous instances of those of Portugal. He now wished to draw the attention of the Society to a beautiful and luxuriant form of Asplenium, bearing a strong resemblance to A. Trichomanes. He had obtained several of these beautiful plants growing in a very sheltered and secluded spot near Killarney, surrounded by high rocks. Its peculiar habits of growth, the great length of the rachis or stipes, and the luxuriant and rich green of the fronds, struck him as differing very remarkably from the more common forms of A. Trichomanes. On referring to Hooker and Greville's beautiful work, "Icones Filicum," T. 195, he found it to be identical with the Asplenium fallax of the Rev. T. Lowe, named so by him on account of its affinities with A. Trichomanes. It was, however, previously found by Mr. Masson, and placed in the Banksian Herbarium, under the name Asplenium anceps, Solander. The Rev. T. Lowe, who has given many interesting details concerning the plants of Madeira and Porto Santo, found this plant at an elevation of 2,000 to 3,000 feet, and at Ribeiro d'Anatado at an elevation of 4,000 feet. It was also found at a low elevation with Asplenium acutum. In Madeira it usurps the place of A. Trichomanes. Mr. Andrews considered the Kerry plants to be identical with those of A. Anceps of Madeira, and to bear the same relation to A. Trichomanes as A. Acutum of Madeira does to the ordinary form of A. Adiantum nigrum.

Professor Haughton recognised this form of fern as one which had been shown to him by a policeman at Killarney, and which at the time struck him as differing in many respects from the ordinary form of Aspl. Trichomanes.

After some further discussion, the Chairman called on

Mr. R. J. Montgomery for his paper on the occurrence of the Egyptian goose (Chenalopex Ægyptiacus). These two specimens of the Egyptian goose were killed on the river Boyne in November last, 1855. Having been told that a small flock of barnacles (Anser leucopsis) had been resorting to the river lately, I went several times to look for them, the barnacle being uncommon in that immediate locality. I saw the flock repeatedly, but at a great distance; I, however, remarked that they had a patch of white appearing on the wing when extended and were not barnacle; and I may here observe that of all the different species of wild geese visiting this country the Egyptian goose when on the wing is by far the handsomest. By watching them closely day after day, and carefully noting their time, and the course they took in their daily excursions, I succeeded on the 14th of November in getting a shot at them as they flew past the boat; the flock consisted of five individuals, I knocked down one, the female on the table, but being merely wounded, I only succeeded in obtaining her five days afterwards. On the morning of the 16th I heard that another had been shot by a man in the employment of James Brabazon, Esq., of Mornington House. That gentleman in the most handsome manner at once presented me with the bird. The geese first appeared in that neighbourhood at the beginning of November; about eight days before they were first noticed it blew a strong gale for three or four days from N.E. to E.N.E, and continued still from those points until they were seen. These were the circumstances under which I obtained the birds. Now, with regard to their being genuine wild geese, I am aware that from the fact of Egyptian geese being so often kept on ponds in a state

of confinement, or rather of half domestication, many ornithologists are inclined to doubt that the birds of this species, occasionally killed at large in England, and those met with once or twice in Ireland, were actually wild; even the late Mr. Thompson, whose judgment, accuracy, and intimate acquaintance with the ornithology of his native land, were, in my humble opinion, unequalled, in his account of the Egyptian goose, vol. 3, page 95 (of the Birds of Ireland), after having mentioned some instances in which this species, freshly killed, had come under his notice, says, "I cannot think that the birds here noticed were truly wild;" but then he qualifies it by adding, "though this species may possibly, as well as others, from the south-east of Europe, and north of Africa, occasionally visit this island," thus admitting the possibility of their doing so. Jardine gives the species a place among British birds; so does Yarrell, who, among several instances which he records of their occurrence in England, Scotland, and the Isle of Man, mentions the remarkable case of a flock of about eighty appearing in Hampshire in 1824. M. Temminck admits it in his "Manual of the Birds of Europe;" and M. De Selys Longchamps among the birds of Belgium. According to Temminck, it inhabits Africa from the north to the middle; is found in Turkey; visits the mouths of the Danube; the islands of the Grecian Archipelago, and has been killed in Germany and Sicily. The birds having thus been killed in a wild state in so many different parts of Europe, including England, Scotland, and the Faroe Islands, there is nothing preposterous in the conclusion that it sometimes visits Ireland in a perfectly wild state. Their manners and habits during the three weeks in which I had daily opportunities of observing them were certainly not those of tamed, or even partially tamed, geese. In their mode of flight they more resembled the Brent (Anser torquatus) than any of the other species of wild geese seen in this country. I think I have shown, on the concurrent testimony of the different naturalists whose names I have enumerated, that they are of discursive habits, and from my own observation I know they are of very powerful flight. On one occasion in particular their vigour and strength of wing were exemplified: it was blowing a strong gale from the westward, and the geese were flying up the river Boyne right in the teeth of the storm at a great elevation. I watched them through a good telescope, and was much struck by their rapid and well-sustained flight. The wary cunning and watchful habits displayed by the wounded bird for the four or five days during which she baffled my many attempts to capture her were certainly not those of a domesticated bird. I am informed by Mrs. Baker, of Grafton-street (who in preserving them has shown her usual skill and good taste), that the stomach of the male contained the roots of grass; that of the female was empty, in consequence of being unable, from her wound, to reach the feeding grounds. As far as I am aware, the only reason given by ornithologists for supposing that the Egyptian geese hitherto killed at large in this country were not wild is, that the bird being so often kept on ponds may have escaped thence. Certainly, in many instances, that may be true; but when we find a flock exhibiting none of the characteristics of birds which have been in a state of confinement, but, on the contrary, possessed of all the attributes of a wild bird—when we remember that these birds visit annually many parts of Europe, are endowed with great power of endurance and strength of wing, I am only surprised that the species does not oftener occur in Ireland. Compare the power of flight of this bird, still keeping in mind its discursive habits, with that of so many stragglers, such as White's thrush (Turdus Whitei), which you no doubt remember Professor Allman exhibited in this society some years ago; or with the beautiful specimen of the golden Oriole (Oriolus galbula) in our museum, a species of which six or seven examples have been killed in Ireland within the last thirty years—nay, even look at many of our summer visitors, whose little wings carry them in safety over hundreds of miles of trackless ocean, and I think we may cease to doubt that these Egyptian geese have at one time actually floated on the waters of the Nile. I once, on a stormy day in October, stood upon the summit of a cliff (in Donegal), 1,954 feet above the Atlantic, whose white-crested billows thundered against its base; the only living things besides my three companions and myself were a ring ouzel (Turdus torquatus) and a snow bunting (Plectrophanes nivalis). On a block of conglomerate, which in beauty almost rivalled the costly scagliola, sat these two strangers, met for the first time and the last—the one the representative of summer, about to commence his long and perilous journey to

the balmy south; the other already clad in winter's garb, just arrived from the frozen north. Where had that little Plectrophanes rested his weary wing? Whether from Greenland, Spitzbergen, Iceland, or Norway he came, neither food nor rest had he; but the geese could rest upon the water, and even find food amongst the floating Zostera.

Dr. Kinahan made a few observations on Mr. Montgomery's paper, with which he quite agreed, as he saw no greater difficulty in believing that the Egyptian goose was an occasional straggler to this country than in the case of those short-winged birds of Africa, and even America, which sometimes reach our shores. In addition to those mentioned by Mr. Montgomery, he might recal to the memory of the members the occurrence of the jay cuckoo, Cuculus glandarius, in the island of Omagh, and the great cowcow, Coccyzus Americanus, on several occasions both here and in England. Indeed, these birds could have no greater difficulty in reaching us from Africa than many of our annual summer migrants. As an instance of the manner in which some of these latter are occasionally driven out of their course, he might mention to them an incident which fell under his own observation during his late voyage. On the 22nd March, 1855, being at the time in latitude 40 S. longitude 38 E., a swallow (H. rustica) flew on board during the evening, having first circled around the ship several times through the dusk. The bird seemed tired out, but not excessively so, when brought to him by the sailor who had captured it. It was plump, in good condition, and most beautiful plumage—in fact, the most perfect moult he had seen. He placed the bird in the cabin, where it remained during that night and a great part of the following day, feeding on the flies in the sky-light, but eventually made its way out on deck, and after remaining hovering about the ship for some time, took its departure in a northerly direction for a more congenial scene. Now, the bird evidently had been driven out of its course; for though a very careful look-out was kept, no other land bird was seen, evidently proving there was not a regular migration going on at that place—the nearest land, the Marion Islands or Crozets, being upwards of 400 miles away, and a most unlikely station for an insectivorous bird—so that it is more than probable that the bird had been driven from the main land, which was distant 700 miles in nearest point, or probably 1,200 miles in that from whence it is probable this bird was driven by the strong westerly gales which had been blowing for some time previous. Now, any one could understand how much easier it would be for a bird like a duck or a goose to traverse an ocean, on which, when tired, it could rest, and from whose treasure it could obtain sustenance, than for a puny insectivorous feeder, no matter how great the power of the latter's flight. Therefore, he thought it probable that these geese were *bona fide* stragglers to this country, and that we owed their presence here to causes other than the interference of man.

After some further conversation, the chairman said, as the evening was not very far advanced he would call on Dr. Kinahan for some remarks relative to native ferns, although not in the notice paper.

Dr. Kinahan rose and said—The few remarks I have to offer are in reference to a matter which it had been my intention to have brought long ere this fully before the society, had it not been for my departure from this country. They are more in the way of queries than actual opinions, and are thrown out now in the hope that some member may be able to take up the matter and clear up one of those doubtful points, now that the season for thoroughly examining them is arrived. It is with reference to the place which two of our British ferns should occupy in a natural arrangement—the common moonwort (Bot. lunaria) and the adder's tongue (Oph. vulgare). Ferns, as you know, have been divided into two great classes, the annulate and exannulate—the divisions founded on the absence or presence of a jointed ring around the theca; the annulate being placed at the head of the list, *i.e.*, next to the flowering plants; the exannulate at the foot of the true ferns, as though they were the link between ferns and the other forms of acotyledons; now, it would appear more natural to seek this link among such genera as Trichomanes or Hymenophyllum; but to pass this over, it seems as if we give this character of the presence or absence of the ring too great a value; for an examination would lead us to believe that in all their other characters we find Botrychium and Ophioglossum more nearly approaching the flowering plants than the annulate ferns do—for instance, in their

hollow stems, in their vernation; this in them is plicate or folded, and not circinate, the former typical or at least the form most prevalent among flowering plants, whilst the latter is that we find most general amongst the true ferns; in their venation: this in true ferns is either purely dichotomous, or some easily recognised form of it—in the genera under consideration, either as in Ophioglossum parallel-veined and reticulated somewhat like smilax, or as in Botrychium irregularly fan-shaped; in their roots, in these ferns more nearly approaching the true root and differing much from the radicles of the other genera, being furnished with a clasping sheath, an organ not found to my knowledge in any other group; and lastly, in the organs of reproduction, which in them is a special development other than the ordinary frond, for the purpose of bearing the fructification; in fact, a branch modified for this especial function, similarly to the manner in which we find the leaf in flowering plants transformed into sepals, petals, and carpels, while in the other ferns we find the fructification borne on a frond, little, if at all, differing from the ordinary fronds. That this is analogous to a branch, or separate flower bud, would appear on examination of such forms as those of Botrychium, which I laid before you just previous to my departure from this country (vide "Natural History Review," vol. ii. Proceedings of Societies, page 15), and by those forms of Ophioglossum in which we find two leafy fronds produced instead of one leafy and one spore-bearing frond, between which extreme forms and the normal one we find intermediate stages, leading us to believe, as I said before, that these organs are true branches—if we may call them so—differing essentially from the spore-bearing organs of the other ferns, and even from their close ally Osmunda, which in every respect (except the ring around the theca, which it wants) follows the annulate ferns, in its circinate vernation, its dichotomous venation, radicular roots, woody stem, and spore-bearing modified main axis—thus leading us to believe that Ophioglossum and Botrychium should be placed next to the flowering plants, then Osmunda, and next the other ferns. These views, many of them already anticipated by other observers and authors, I throw out for your consideration, in the hope that some among our many members may be enabled during the coming year to assist me in the investigation, and thus clear up this most important point. There is another point in connection with these species worth inquiring into, whether, as Newman surmises, they be really parasites or not.

After some discussion, Mr. Andrews exhibited a beautiful specimen of oak spangles, in connexion with the galls brought forward last evening.

A ballot then opened, and at its conclusion the chairman declared Thomas Wilson, Esq., jun., Dublin, duly elected an ordinary member.

The meeting then adjourned till the month of April.

EXTRA POPULAR MEETING.

MARCH 26, 1856.

His Grace the Archbishop of Dublin, President of the Society, in the Chair.

Mr. Andrews gave a long and interesting paper on the Ferns of Ireland, their distribution and modes of cultivation, illustrating his remarks with a fine series of Irish specimens, many of them very fine and rare, including Trichomanes radicans var; Andrewsii, from Kerry; Asplenium Trichomanes var. fallax, Kerry; Lastraea spinulosa, Kerry, and many others of great interest.

APRIL 11th, 1856.

James R. Dombrain, Esq., in the chair.

The minutes of the previous meeting having been read and confirmed,

Dr. Frazer read the following paper "On the disease in gold fish, in connection with the development of Saprolegnia ferox."

The plant which is the subject of the present communication is by no means of extreme rarity, nor is it of local or limited occurrence. It has been observed with considerable accuracy of many scientific naturalists, and we possess several good descriptions and drawings of it. Thus, amongst others, Ledermuller, Wersberg,

Spallanzani, Lyngbye, Kutzing, Carus, N. V. Esenbeck, Agardh, Berkeley, Braun, and especially Unger, have each contributed to our knowledge of its natural history, and recorded its most striking peculiarities. It has been recognised in Denmark, Prussia, Austria, various parts of Germany, France, and the British Isles. The following are the chief synonyms by which it has been known :—Saprolegnia Ferox, Kutzing, Phycol. General; Conferva Ferox, Gruithuisen, Nov. Act. Leopold Car. 1821; Byssus Aquaticus, O. F. Muller, Flora Dan.; Vaucheria Aquatica, Lyngbye, Hydr. Dan.; Hydronema, Carus, Act. Leopold. 1823; Saprolegnia Molluscorum, Achlya Prolifera, N. V. Esenbeck; Leptomitus Clavatus, Prolifera and Ferox, Agardh, Syst. Algar.; Leptomitus Piscicola, Berkeley. It is not uncommonly found growing upon the bodies of flies and other dead animal substances which have fallen into water, especially in the summer months, and it is also well known to occur upon the bodies of living fish, and to produce a most destructive form of epizootic disease amongst them—a perfect plague of extremely contagious nature. M. Davine has described its baleful progress amongst the carp contained in a large pond in France. Hannover and Stilling also notice its appearing both amongst living and dead animals, growing, "avec une extreme rapidité," and producing in the former illness followed by death. Unger likewise, in 1842, found sick Cyprini, with the plant fully developed upon them, in a pond in the Gratz Botanic Gardens; and during the same year he asserts that the fish in the environs of the town were similarly affected, in so much, that mouldy fish, as they were commonly termed, were often to be met exposed for sale in the public markets; in one large pond all the fish were exterminated by its ravages, and in the reservoirs the thymale and trout also occasionally suffered. He says, "It killed in about 48 hours; few recovered which were once attacked; it grew both on the body and the fins; the fish lost their natural activity, sought the surface of the water, and seemed fatigued; the plant extended from the mouth to the vent, like a covering of velvet; the scales at the point attacked loosened and fell off; the parts affected were evidently enlarged, reddened, spotted with blood spots, and occasionally ulcerated; the fish appeared to move with pain, lay on their sides, or back, and these symptoms usually preceded death for only ten hours." To complete its history, I may mention that it has been met upon dead flies (Gœthe and Nees); on the dead larvæ of the land salamander in water (Carus), of dead mollusca (Gruithuisen); on the wounded toes of the Triton Punctatus (Hannover); upon a wounded eel (St. Pierre); upon the eggs of Limax Agrestis (Laurent); and of Lymnæa Stagnalis (Valentin); upon both the ova and wounded body of Cyprinus Nasus (Valentin); upon the eggs of the stickleback (by M. Coste); and it is even stated that the current of water through their nests is probably intended to prevent similar occurrences. Valentin has also noticed it on the eggs of the Bufo Obstetricus; Pennant described it as it occurred upon roach kept in glass vessels, and it is well known to attack various species of carp, especially our well known favourite, the Cyprinus Auratus, or gold-fish. Of its occurrence on this animal we have a description by Dr. Bennett, in the Edin. Philos. Transactions. Finally, Kutzing has described three species (which I believe to be all identical), one of which is termed the Saprolegnia Xylophila, and found growing upon twigs in water. I too have likewise in my researches obtained it growing upon twigs, identical in its nature with his drawings, and with the plant as it grows upon the bodies of living and dead gold fish, and derived originally from them. Further research on this subject has obtained for me the information that (what is probably the same plant) the Saprolegnia Capitulifera has been observed by Alex. Braun (Rejuvenescence of Nature) to develop freely on decaying pieces of Nuphar pumilum, and also to attach itself to flies falling into the water in the localities where it thus grows on the plant. This plant (which fully deserves its name of Saprolegnia ferox), as it fell under my notice, occurred amongst a number of young gold fish (about twenty-five) kept in a parlour, contained in a round glass jar along with four young minnows. The gold fish had been obtained from the Botanic Gardens of the Royal Dublin Society, at Glasnevin, in September, 1855, having been bred there in the Victoria Lily House, during the previous summer months. They were of small size, varying in length from one to two inches; and as I had obtained them for the purpose of making a series of observations upon the changes which they undergo in colour during their growth,

I had them in every stage—gold, silver coloured, and white, and also dull brown. On the 28th of January, 1856, I first noticed that two of these fish each had an extremely beautiful white tuft, resembling somewhat the appearance of common mould, upon their side. The extent of this patch of vegetation was not more than the size of a spangle. The fish were swimming about briskly, and appeared in perfect health; and I am certain there could not have been any extent of this plant —at least sufficient to be visible to the eye—present upon them twenty-four hours previously. I instantly isolated the two attacked for observation, washed out the jar, and placed the other fish in it. They were still to all appearance healthy to the most minute scrutiny. In the course of twelve hours more the plant had rapidly extended in the two fish, occupying fully twice as much of the surface as it did in the morning, and next morning (24 hours) it had spread over more than half the body, reaching from the nose to the ventral aperture. One was completely dead at ten a.m., and the other died early next day (30th January). As the plant extended over their bodies they appeared to be stiff, and swam as if moving with difficulty, seeking the top of the water; they afterwards seemed unable even to do this, sank to the bottom, and lay there sluggishly on their sides or in their usual positions. Previous to this one of them appeared for a time to become top-heavy, his head sinking down so far as to threaten to turn him completely round on his back, and he made great and evidently painful efforts to regain his usual level position. After death the plant still continued to grow over their bodies, developing on the snout and over the mouth, and on the fins and tail. After a few days the plant manifested itself amongst others of the fish in rapid succession, upwards of half of them dying within twenty days from its first appearance amongst them (the minnow escaping its ravages). Those that last died presented visibly merely the appearance of white films extending over their bodies and dangling from their fins and tail, and did not develop during life the full-grown plant with its tubuli, although in some it became sufficiently evident after death, and reached its perfect state and formed its zoospores. On most of those attacked at this time I noticed red bruise-like marks behind the gills, and especially upon the lower jaw, and in some also on the upper; similar appearances occurred around the ventral aperture, and in two or three upon the sides; but these first attacked did not present such appearances, nor did those which died more recently. When attacked, my attention would usually be attracted to them by their rising to the top of the water and swimming in a peculiar uneasy manner, as if stiff or pained as they attempted to move, afterwards they became more and more languid and sank to the bottom, breathing at longer intervals than in health and irregularly, and dying usually as if suffocated, with their gill covers widely distended and the gills visible. I may here state that I examined these fish most carefully after death, their gills especially; the most external of the branchiæ were in parts loaded with masses of germinating spores of the plant, which evidently had the effect of destroying their structure and disintegrating them, stripping off the fine lobed capillary processes from the denser cartilaginous structure, and finally loosening the cartilages and necrosing them. The developed plant consisted of very fine fibres, forming dense interlacing masses, which somewhat resembled the fine nap on velvet. The fibres were of rather tough consistence. Those I at first obtained were straight and unbranched, afterwards I found a branched condition equally common. The tubuli contained an amorphous mucilaginous fluid, with masses of globules, aggregated in very unequal amount in various parts—the larger were evidently oil spots, and almost filled the diameter of the smaller tubes; others were more minute, and multitudes were so small as merely to present the appearance of the finest dots—these distinctly exhibited "Brown's movements"—and in some instances I had fine views of the more perfect circulation, termed "cyclosis." The tubuli rarely had partitions; they ended when sterile in blunt tops, gradually tapering upwards, and in oval capsules when fertile. I could trace all the stages of the formation of these capsules. First the granular matter developing more densely at the upper part of the tube than elsewhere, so as to give it a distinct brownish colour, the top then becoming dilated into an ovoid form, and the granular matter still thickening and becoming separated from the ordinary contents of the tube, and the septa rapidly forming by the inflexion of the utricle. Afterwards,

exactly as described by Unger, the fructification progressed towards its developement, the granular matter continuing to become more dense and opaque, and in its structure numbers of comparatively clearer spaces formed, which increasing, at last showed the capsule filled with from twenty to fifty zoospores arranged like the meshes of a network, and having still some granular matter evident at the sides of the capsules. I then distinctly noticed a movement of the four anterior zoospores (this I wish to state distinctly, as I find that Alexander Braun, whose accuracy of observation is so well known, states that in "Derbesia, Saprolegnia and Chytridium the motion" which commonly occurs in other families, "does not become evident until after birth of the previously crowded germ cells"—I have also been able to verify this movement more than once) previous to their escape from the mother cell, one of them applying itself to the flask-like orifice, and gradually forcing its way out; evidently, as sketched, undergoing considerable pressure in the process, which probably, in this instance, occupied half an hour. Its escape was soon followed by that of the other zoospores, generally emerging two by two, one succeeding the other with great rapidity, and darting out for some distance (at least half the length of the capsule) into the water; they then, after a short rest, floated off right and left with evident motive power, and the other cells in the capsule in their turn began to exhibit independent movements and to escape; finally, the entire got out, leaving the capsule empty, the process taking altogether half an hour or a little longer for its completion. Almost all the zoospores that I observed resumed their globular form soon after escaping, and ceased to display motile force in the course of six to ten minutes, after which they became stationary. To illustrate the rapidity of the formation of these capsules, I may mention that a tuft of barren tubuli, removed late at night and placed for observation in a glass cell, had developed its fructification in great luxuriance by next morning (within twelve hours), and from this I obtained the varieties of globular mother cells, and those with double and triple cells, and also those remarkable monstrous forms in which the barren tube grows again above the apex of the capsule. Some of the barren tubes grew to a very great size and thickness, and developed spores within their substance; this, however, was extremely rare. I also saw such a tube emit four spores from its extremity, but they displayed little motile power, and floated off only a short distance after their escape. I cannot decide as to these spores having cilia. Thurot describes their having two, Alex. Braun found only one single short cilium. I did not succeed in getting them; probably I might with higher powers of the plant. It is, perhaps, too often assumed that cilia are indispensable for producing motion in cells. I obtained very perfect views of the mode of propagation of the spores. Many of them multiplied by a process of gemmation exactly like the cells of yeast; and the freshly-formed cell might by observation be seen with its fine granular contents aggregating together and forming large masses, and even transparent glistening globules of oil. So rapid was this budding process that the same parent cell had occasionally two, three, and four buds derived from the various parts of its surface and in different states of development. As they acquired a bulk nearly equal to that of the parent cell, I could generally observe the formation of a division occurring between the two; and this rapid production of cells soon formed dense masses of vegetation, which by a little care could be seen growing under the microscope. I would wish to direct attention to a very interesting mode of development which I have procured sketches of—the formation of thin hair-like shoots proceeding from a parent cell, and at its extremity the reproduction of the cell-form again resumed, in its usual condition prepared for active fissile development. I would merely state, in connection with this, that the growth of some forms of mould appears to be closely analogous to what I have described. Thus, I have seen similar thread-like processes connecting the sporules of the Ascophora Mucedo, and it appears to me to be both an indication of extreme vital energy in the reproductive process and also an arrangement, the object of which is evident, to enable the spores in their development to spread more rapidly over a more extended surface, and to interfere less with each other in their mutual growth. Having thus obtained a second condition of this plant, in which it is a rapidly budding unicellular body, I watched with much care for its return to the tubular form, and was able to trace it pretty perfectly. As the masses of cells developed they became rather larger in bulk and less defined (their utricle or limiting membrane, if at all existing, being

of extreme fineness), and from the surface of the growth, one of the cells developed the new shoot, which resembled in all things the parent plant. It remains now to describe what I believe is new, at least as far as my researches go—the fact that this unicellular rapidly developing condition of the plant is perfectly capable of destroying life in fish; many, indeed almost all of them, which have recently died with me, and I have now lost all my fish but three, have presented this state of plant alone (at least during life). It adheres in dense masses to the fins, the tail, and even to the edges of the scales over the body; it collects on the gills, disorganises them, breaks down the higher organised tissues, lays bare the cartilaginous structures in the gills, tail, and fins, and interfering with respiration (as it seems to me), proves even thus more rapidly fatal than from its more slow but equally certain destructive action on the vital tissues. It is impossible not to recognise in this, which might be termed a "mycelium stage," a strong analogy with the mycelium stage of fungi. We know how dry rot, for instance, produces its destructive ravages in wood in its rapidly growing mycelial condition, not in its more advanced state of development, and I have in my researches on this subject become strongly impressed with the conviction, that it is to this as yet unrecognised state of the Saprolegnia we are in reality to ascribe much, if not all, of the destructive action which it exerts on animal life. In fact, I believe we have in it a clear instance of a plant causing disease in healthy bodies, and not, as is too commonly believed, a mere vegetative growth developed on a body already in a state of ill health. Such is, indeed, the general doctrine held with reference to Epiphytic growths occurring in disease, which are frequently regarded as accidental Epiphænomena; whereas their invariable presence alone in such cases would of itself go far to the unprejudiced mind to prove a more intimate connection between them and the diseased condition which they accompany, or, as I think, frequently produce.

Mr. Williams corroborated the fact of the destructive properties of this disease, as exemplified in gold fish formerly in his possession, which were completely smothered by it. He attempted to destroy the disease by removing the diseased spots, but ineffectually.

Mr. H. Barton mentioned that some years since he found that some minnows and sticklebacks which he had in confinement died of this disease; they had been fed for some time previously on bread crumbs, after which he had placed them in a vessel with some gold fish. These latter remained perfectly free from the disease, though all the minnows and sticklebacks died.

Dr. Kinahan had seen this disease in the following aquatic animals while in a state of freedom and alive; gudgeon, Gobio fluviatilis; loach, Cobitis barbatula; eel, Anguilla acutirostris (young), stickleback, Gasterosteus leiurus; fry of salmon, Salmo salar, and trout, Salmo trutta, and in the smooth newt, Lissotriton punctatus. During one season it was so prevalent in one part of the Dodder, that nearly all the salmon and trout fry were destroyed by it; he had also seen it on the larva of the dragon-fly.

Mr. Williams read the following

ON A REMARKABLE CHANGE OF COLOUR IN A FOWL OF THE HAMBURGH BREED.

Gentlemen, I beg leave to bring before your notice this night a remarkable change of plumage in a hen of the Hamburgh breed, which is painfully recorded in my mind, from the fact, that, by whatever affected, whether fright or otherwise, I lost the chance of the silver cup in the crested class at the last Liverpool show in January last. When I selected this bird in the beginning of January, as one of a pen fit to compete, she was then perfect in the markings so characteristic of her variety, each feather being accurately marked, as well as having her legs blue, which is the proper colour of the breeds. The lot was not commended, and on examining the several pens at the show with a critical amateur, and discussing the several merits and why this pen was passed by unnoticed, he pointed out what, in his opinion, was the cause, viz., that the legs of this bird were white, as he could not detect any other defect; in this view I was obliged to acquiesce, but I was not the less astonished, thinking it impossible that I could

have sent a bird with such a blemish. On receiving my birds home, I particularly examined her, and saw that her legs were opaque white. In about a fortnight afterwards they became vivid pink behind, which colour has since departed. I further observed that some of the hackle and back feathers were not laced with black, although I am sure they were so before she left Ireland. I was about to kill her, as of no further use, but on consideration thought it better to retain her, and watch if this progressed. Prior to being despatched, she was, as I said before, perfect in every respect, in apparently perfect health and laying sound eggs; shortly after her return she was constantly looking for a nest, and laying soft eggs, and became so fat that her natural shape was altered. I immediately procured some old lime rubbish, and in about a week her anxiety to lay diminished, and her eggs had the shell perfect as usual. I have continued to observe, and found almost daily changes, the black markings vanishing and the feathers remaining purely white. When despatched to Liverpool her tail feathers were pure white, accurately laced with black, which almost totally disappeared, but now seem to be increasing, though irregularly. This bird is now in her third year, and is one of the lot with which I took the first prize at the December show of the Amateur Poultry Society of this city. A sister of hers, in the spring of last year, presented similar features, but not so remarkably, the markings becoming so indistinct as to appear as if viewed through gauze. I had her killed, and she proved a very superior bird on the table; some of her eggs were set, and of the produce four birds were marked as the one now exhibited; they were the largest chickens of the kind I ever saw, being much larger than others of the same age, one of which presented features so nearly approaching both sexes that until near a year old it could not be decided whether it was male or female. When hatched they were pure white, with the exception of some black spots on the side of the head, but on moulting acquired black collars and some spangled feathers, with almost obliterated markings. The exhibition of these will convey to the members how varieties of poultry are produced. The bird in question, in common with others, was fed on India meal, oats, potatoes, and barley occasionally, and had an extensive grass run. I shall now pass to another portion which demands the attention of physiologists to account for, and which, as far as I can discover, is unexplained. I have at various times observed changes in the colour of feathers, but from not having carefully watched them thought I must have been mistaken, until my attention was aroused by a paper given in this Society on the changes that occur in the plumage of birds without a moult, as in the case I allude to, that of the black-headed gull, Larus ridibundus, where the feathers of the head change almost suddenly from white to black, as also in the breast of the plovers. In the bird before you we have the reverse. We are all aware that sudden discoloration frequently occurs in the head of man, and that changes in colour appear in several animals from shocks of the nervous system, disease, injuries, or abrasions; in the case of farcy in horses, whence they become spotted all over with white, under the collar and saddle, &c. I knew a case where a hen, which I still have, was bitten by a dog across the back, and white feathers almost immediately appeared in the shape of the bite. These disappeared on the next moult. I knew a case where a mare was bitten in the crest by a horse, and for four generations the foals had a white mark on the crest in the shape of the mouth. It has been my anxiety to produce male birds of the Hamburgh fowl, whose tail feathers should be white laced with black, as shown in the plate of Rees' Cyclopædia (produced), and last year I was successful, but was surprised to see that on the moult of the bird for this year the body of the feather was deeply mossed; some time after the bird was moulted, the mossing declined, and some of the feathers were pure white, laced with black. I was not able to keep this bird for want of space, but shall from time to time hear what changes may take place. I presume this subject has somewhat to do with Albinism; on which question, as relating to the ferret, I read a paper before this society some years ago, and now lay on the table specimens of several birds in exemplification.

Mr. Montgomery read some notes on experiments he had made to try the effect of extracting periodically eggs from the nests of birds, thereby causing them to lay

more than the usual number. He found that such eggs were deficient in markings and shape. He also observed that the birds hatched from them were weakly and splashed with white. In this case the bird appears perfectly healthy, and yet these abnormal changes have taken place. He had also seen great and rapid changes of colour in the legs and cere of falcons, which were dependent on the state of their health.

Dr. Frazer stated that he had observed as extraordinary changes in the hair of the human being. During the year of the famine many of the half-starved creatures who came up to Dublin from the west had regular piebald heads. In another instance, in a man working in a brass foundry, he had seen a lock of greenish hair occurring in the middle of a head of white hair.

Mr. R. J. Montgomery, in connexion with the subject, exhibited a most interesting specimen of an Albino razor-bill (Alca torda), perfectly milk white, even to its nails and eyes. When taken it appeared blind. He considered the specimen as unique. It was from Clogher Head, county Louth. He also exhibited a curiously marked Albino magpie (Pica melanoleuca), in which the glossy black of the flanks and wings were replaced with dull brownish white, except the quills, which remained black. For this specimen he was indebted to G. Rotheram, Esq., of Crossdrum, county Meath. Mr. Montgomery also made some interesting remarks relative to the mode in which wild birds change their colours, especially in regard to what he called "edge-moulting," in which the tips and edges of the feathers wear away, and bring to view the lower part of the feather. This is sometimes effected by the bird itself biting off the ends of the feathers, and is well seen in the stonechat (Saxicola rubicola), and snowbunting (Saxicola œnanthe).

After due ballot, the Chairman declared the following duly elected ordinary members:—William C. Stephens, Esq., Dublin; Richard Ussher, Esq., Cappagh, Cappoquin, county Waterford; and R. W. Wilde, M.D., M.R.I.A.

MAY 16, 1856.

CHARLES P. CROKER, Esq., M.D., M.R.I.A., in the Chair.

The following donation was announced to the library:—The Proceedings of the Geological Society of Dublin for the Session 1855-56, from the Society.

James Haughton, Esq., junior, read the following—

REMARKS ON MOTHS WHICH CAUSE DESTRUCTION IN GRANARIES.

On a former occasion I brought before the Society some observations made upon the destruction of corn by different species of coleoptera, more mischief being done by the weevil tribe than by any other; and my attention being called to the subject, I was led to think that much damage was done by other depredators as well as those at that time mentioned. I accordingly kept the subject in view, and accidentally discovered a large colony of larvæ, which, as far as damage to corn is concerned, I think I may with justice rank second to the weevils. During the spring of 1855, whilst passing through a corn loft, my attention was attracted by a quantity of wheat mixed with dust lying on a window-sill, which presented a somewhat unusual appearance, a good deal of it being eaten in a manner totally different from the way the weevils hollow it out, every grain touched having the larger or germinating end just taken off, and neatly rounded. On looking for the cause, I found a great number of small larvæ, busily at work consuming the wheat. A few days afterwards, on paying them a second visit, I found them either spinning their webs, or preparing to do so; and, from the great number of these webs placed so closely together, irregular masses of wheat and dust could be lifted in layers of from one to three inches in thickness. I placed a small quantity in a box, where it remained forgotten until the middle of June or beginning of July, when, on opening it, I found that a large number of small moths (T. granella and cloacella?) had made their appearance, and about this time great numbers of similar moths swarmed about the stores and the outbuildings around them. About a month

since, I remarked, as I thought, a curious fungus growing from the beams in one end of the loft. I cut a quantity of it away with my knife, and found that the wood, which was partially decayed, was tunnelled out in every direction by similar larvæ, and even in some places the sound parts of the beams pierced like wood affected with dry rot. The particles cut out during the process of boring were conveyed to the end of the tunnel, and, being held together by a web-like substance, projected in patches of from one-half to three-quarters of an inch in depth from the beams, and formed the excrescence which at first caught my attention. Some time previous to this, the warehouseman called me to look at a large quantity of (as he thought) sea sand which remained after the removal of a quantity of wheat, and which he imagined must have been mixed for the purpose of adulteration. On a superficial examination the resemblance was very striking, but on lifting it in the hand its lightness at once told that it was very different. On close examination I found it was entirely composed of the rejectamenta of the larvæ alluded to. The quantity on the loft was very considerable, which shows how destructive the moths are. The wheat is eaten in a peculiar manner. In every instance, as before mentioned, the germinating end is destroyed, and the exterior coat of the grain consumed in preference to the interior. In this they differ from the weevils, which hollow out the interior of the grain, leaving the exterior almost untouched. I do not mean to say that the larvæ refrain from touching any portion but the outside of the wheat, but that they appear to prefer it to the interior. It may be worth mentioning, that in most cases where the cocoons were fastened to the walls, a number of these gnawed grains were attached to the webs; but this may, I think, be perhaps attributed to the wheat becoming entangled during the turning or shifting on the loft. In the beginning of April of the present year I placed a quantity of the wood cut from the beams, and well filled with larvæ and cocoons, in a box, and about the end of the month, on opening it, I found that a few moths had come out. A peculiarity in their habit deserves to be noticed—namely, on opening the box in which they were they did not at first attempt to fly, but ran quickly about, hiding wherever they could amongst the contents, and, if well concealed, would not stir unless again disturbed.

The species which occurred were Tinea granella, T. cloacella (a single specimen), Œcophora pseudospretella, and Endrosis fenestrella. Of these, Tinea granella were in the greatest abundance. Their larva are about one-fourth of an inch in length, and whitish, with a reddish-brown head; chrysalis brown and semi-transparent. Numbers of these larvæ were found embedded in old wood, and very many of them also hanging from the outside of the beam, presenting an appearance somewhat similar to the larvæ figured and described by Mr. Haliday, as infesting the horns of oreas canna, which larvæ were supposed to belong to the Tineidæ—*Vide* Page 23, plate 1, fig. 3.

The next in abundance was Œ. pseudospretella; its larvæ closely resemble those already described, differing chiefly in size, being larger and more active. The pupa does not call for any particular description.

As for that "universal scavenger," Endrosis fenestrella, I need say but little, owing to its being already so familiar to entomologists. For the identification of the species enumerated (with the exception of T. cloacella, determined by Rev. A. R. Hogan), I am indebted to the kindness of E. Percival Wright, Esq., who forwarded them to H. T. Stainton, Esq.

Mr. Andrews observed that the subject of Mr. Haughton's paper was most valuable, entering as it did upon a field of inquiry with regard to the destructive properties of a class of insects whose ravages were not easily guarded against. They were the pest of the naturalist (?) as well as the farmer. He hoped that Mr. Haughton, from the favourable opportunities he had, would continue his observations, and endeavour to note the changes, and to obtain the pupa and perfect insects, of the several species. They appeared more abundant in England than in this country, and several species had been noticed to Mr. Andrews in the farm granaries. The chief was the Tinea Granella. Preparations of vinegar and salt had been used to destroy them, but stronger remedies too frequently tainted the wheat or other grain.

The Rev. S. Haughton, F.T.C.D., Professor of Geology, read the following—

ON THE ANALYSIS OF SPODUMENE AND KILLINITE.

Having been asked to arrange the minerals belonging to this Society, and finding among them fine specimens of Spodumene and Killinite, both of which minerals are becoming now rare, I was led to make a particular examination and analysis of them, especially as the published analyses of Spodumene are, for the most part, confessedly imperfect, having been made at a time when perfect atomic analysis was not carried to as great perfection as it is now.

Spodumene is a rare mineral, which has hitherto, as geologists are aware, been found in Europe, only in Sweden, in the Tyrol, and in Ireland; not being found in any other part of the British Isles. A careful analysis of the Society's specimens gave the following result:—

ANALYSIS OF SPODUMENE.

	In the 100 parts.		Oxygen ratio.	
Silica ...	64·28	...	1·397	= 2
Alumina ...	27·76	..	0·540	= 1
Protoxide of Iron	1·54			
Lime ...	0·67			
Potash ...	0·54	...	0·165	
Soda ...	0·48			
Lithia ...	5·79			
	101·06			

Formula $(3RO, Al_2O_3)(2 Si O_3)$.

He next examined the Killinite, with a view to establish some doubtful points in its history, and mentioned, that some time previous he had been given some fine specimens of Killinite, from Killiney, of a leek green colour. These were handed over to the Rev. Mr. Galbraith, who had been engaged in an examination of the ordinary hair brown variety of Killinite, and on analysis the two varieties proved to be identical, except in colour.

It has been supposed that the two species, Killinite and Spodumene, ought really to be considered as one. To this theory the above analysis seems to oppose a very great difficulty; for, adopting Berzelius's theory of oxygen atoms, we will find that in Spodumene, as shown above, the oxygen in the acid is as two to one of the oxygen in the base, while in Killinite it is as three to two. The lithia, according to Galbraith, is altogether absent from the Killinite; and, according to Mallet, who has also published careful analyses of this mineral, it exists as a mere trace.

The specimens of both these minerals, however, being very fine and perfectly crystallised, Mr. Haughton was enabled to measure the angles, and thereby prove a most important fact, which is, that the angles of the crystals of the one mineral are supplemental to those of the crystals of the other. This fact proves the perfect identity of the two. To explain the seeming contradiction of the analysis, we must take other matters into account. In addition to the difference stated above, we find that Spodumene is anhydrous, and Killinite contains 8 per cent. of water. We also find that whilst external appearances are the same, the Killinite has a soapy feel, which Spodumene wants. This soapy feel, which is generally looked on as a proof that we are dealing with an altered mineral, gives us the clue to the whole matter. Killinite is an altered Spodumene, which has become hydrated. The silica in it has followed the general rule and become diminished by a fourth, and the lithia (one of the most soluble of the alkalis) has been dissolved out.

Rev. J. Galbraith stated, that having this subject called to his mind by the

notice of the preceding paper, he had been led to look over the notes of his analyses of Killinite, given him by Dr. A. Smith, and also the leek-green specimen mentioned. The results of these analyses Mr. Haughton had already stated. Killinite is a mineral which has only been met with in Ireland, and then only in Killiney Hill, near this city. Several attempts have been made in Germany and elsewhere to identify this mineral with Pinite and other minerals, but without success. He would not detain the Society with a detailed analysis of the mineral, as several most accurate analyses have been published—the first by Leight and Blythe, and since then by Robert Mallet, and others. He found, however, one discrepancy between the analyses of these gentlemen and his own—viz., the quantity of water present as their analyses gave ten per cent., while his gave only eight. This fact, taken in connection with the extreme accuracy of their other analyses, furnished an additional proof of the truth of Mr. Haughton's statement, as they showed that the specimens of Killinite vary in the proportion of water present—a discrepancy well known to exist between specimens of most hydrated altered minerals. He perfectly agreed in the justness of Mr. Haughton's views, and considered the identification of the minerals as most valuable.

The meeting then adjourned to the month of June.

EXTRA POPULAR MEETING.

MAY 21, 1856.

ROBERT CALLWELL, Esq., M.R.I.A., in the Chair.

Doctor Kinahan gave a paper on the crustacea podophthalmia of Ireland, with especial reference to those found on the Dublin coast, illustrating his remarks by diagrams and specimens from the Society's collection, including Thia polita, a species first obtained in Europe, by the lamented M'Calla, in Roundstone Bay, and made public through the medium of this Society.

JUNE 13, 1856.

Rev. Professor HAUGHTON, F.T.C.D., M.R.I.A., in the Chair.

Minutes being read and signed, thanks were voted for the following donations since last meeting :—

Address of the President of Cork Cuvierian Society for 1855-56; from the Society.

Third Report of the Commissioners of the Exhibition of 1851; from the Commissioners.

Doctor John Robert Kinahan, Honorary Secretary, read the following :—

ON BOTRYCHIUM LUNARIA—ITS MOST REMARKABLE VARIETIES.

It may be within the recollection of some of your members that, two years ago, I brought before this Society some specimens of varieties of the common moonwort (Botrychium lunaria), including two exhibiting a deltoid outline. I hope I will not be thought to be fruitlessly occupying the time of the Society "with a twice told tale" if I again call your attention to this variety. On the former occasion, being on the eve of my departure for Australia, I did no more than draw your attention to the form. Indeed, its full value in reference to the laws of morphology did not at that time strike me, and I contented myself with recording it as a digitate subvariety of lunaria, and pointing out its bearings as illustrative of the relations subsisting between the two, as they are called, "*fronds*" of the ordinary plant; but into the relations subsisting between it and the classes of monstrous forms—on a former occasion laid before this Society in some detail—I did not at all enter; for, having found but three plants partaking of these characters, it

appeared to be merely a sub-variety—*i.e.* a monstrous form of only accidental annual occurrence.

Since my return, however, happening, after a lapse of nearly two years, to be in the neighbourhood of the station where I first found the original three plants, I visited it, to see how the station was getting on; when, to my surprise, I found no less than eight plants, all partaking more or less of this character, three of these exactly identical with my former specimens, as you may see on comparing the plants on the table with these dried fronds. Four of the plants then found exhibited the digitate form in full perfection; the others, all more or less perfect; one, in addition to the conversion of its lower pinnules in a pinnate pinna, having some of these pinnules again converted into spore-bearing sprays, showing in a beautiful manner the structure and development of that organ: two of these have been figured (plate 5), the plant to the left representing the most perfect of my specimens obtained in 1854; that on the right, another of the specimens then obtained, illustrating in a remarkable manner the way in which the deltoid form is produced.

From examination and comparison of these forms with other modifications of this fern, it may be easily seen that, as conjectured by me on a former occasion (*vide* ante Proc. Soc., p. 55), the fruitful part of the frond of Botrychium is to be looked on rather as being the analogue to a branch, than a leaf; being a branch whose pinnules, representing the leaves, have been modified into spore cases, representing the flowers placed sessile around the branches. One of the specimens on the table well illustrates this passage; first, we have the ordinary barren branch taking on the deltoid type, and then one of the so-formed triangular pinnæ having some of its minor pinnæ converted into spore cases; and on dissecting this plant I found that the young fronds, which are to be found folded up at the base of the plant, all exhibited the same curious type, so that, for three generations at least, had this plant been undisturbed, these same anomalous characters would have been preserved. I may add, that dissections of other specimens of the variety gave the same results. This constancy of its characters, through succeeding years, places the plant among my varieties.

The next question is, to what variety should it be referred; and even a cursory examination shows, that though so seemingly different in appearance, it really belongs to the group with cristate apices to the fronds, and for which I proposed the name of Cristatum; for, on comparison with the forms of the common harts-tongue (Phyllitis Scolopendrium) referable to that group, especially the highly compound form called by its discoverer Digitatum (*vide* Nat. Hist. Rev., vol. I, page 145; note), we find that exactly parallel changes take place, the veins which should normally be aggregated in a single bundle becoming separated into several bundles and thus branched, the outline of the simple linear frond thus becoming partially branched, even as in this case the simple linear outline of the partite frond has become deltoid, of course the venations being of different types in the two plants, this distinctive type is also kept up in the varieties.

In Botrychium lunaria var. cristatum, the following changes take place. In the ordinary form two distinct classes of venation are observable in the barren and fertile branches respectively. We find, commencing at the ground, that we can trace four distinct sets of vessels running up the stem, two destined for the fruitful, and two for the barren branches. Those in the barren branch again pass up as two distinct sets, one on each side of the axis, each set giving off a *single* bundle of vessels to each pinnule of its own side; and the two finally giving origin to a number of veins, arranged as a fanshaped venation at the apex of the frond. The bundle of fibres given off to each pinnule, in its turn giving origin to veins fan-shaped in their arrangement, each pinnule, indeed, exactly analogous to the apex of the frond.

In the fruitful branch we find each bundle giving off *two* bundles to each of its bunches, these bundles in their turn giving rise to either double or single bundles, according as the branch which they supply is branched or not—in short, each terminal bunch or cluster representing the single pinnule of the barren branch.

This is the ordinary or more usual arrangement of the bundles, and may, I think, be looked on as the typical or normal venation of the plant. (Plate vi. fig. 2.)

Let us now contrast the arrangement of parts in variety Cristatum. The fruitful branch remains, of course, unaltered, but in the barren branch great changes occur, instead of *one*, we find that *two* bundles are given off from the main bundles at base of each of the lower pinnules, and each of these bundles gives off in turn *a single* bundle to each of its secondary pinnules, and these tertiary bundles comport themselves exactly as the secondary bundles in the ordinary form. In fact, the whole arrangement resembles very closely what has been stated to occur in the fruitful branch, the arrangements being, in fact, identical, as proved by the specimen quoted before, in which these secondary branches of the main branch were some of them fruitful, proving that these barren lower pinnæ of the deltoid form are identical with the fruitful branches of the common form, and that, therefore, the fruitful branch, as already stated, is merely an extreme modification of the barren branch, each pinnule of the latter representing a bunch or cluster of the former, and each linear cluster of the former representing a single division of the pinnule of the latter; as also can be shown by examining the venation in the pinnules of the deeply-incised form of the moonwort, which often bear sori on their edges, each sorus presenting at its base an arrangement of veins similar to what I have attempted to describe on the fruitful branch. (Plate vi. fig. 1.)

This variety now under consideration occurs both in the ordinary form of Botrychium Lunaria and in that with deeply-incised pinnules, and this brings us to the consideration of whether this form may not be Doody's old plant, recorded by Ray. I am inclined to think it is; though a most competent judge on the matter, Edward Newman, has referred this plant of Doody's to the species Rutaceum, Swartz, as also Sir J. E. Smith, in the English Flora (vol. iv., page 328). Ray describes his variety as follows (*vide* Phytologist, vol. v., page 129; Newman's British Ferns, third edition, page 320):—"Lunariam minorem ramosam et Lunariam minor *foliis dissectis*, Westmoreland, D. Lawson; hujus plantæ varietates; non distinctas species opinatur. (D. Doody, Syn. II., App. 340.) Lunariam minorem foliis dissectis revera distinctam speciem vult, cum segmenta seu lunulæ *non solum eminenter sint sectæ, sed planta etiam elatior sit et botrus racemosior*. Est Lunaria botrytis minor *pinnulis laciniatis*, in Borealibus nostris Pluk. Alm. 288." Now, this whole description, especially *foliis dissectis*, and "non solum eminenter sectæ" (qy. cut at the apex) sed *planta etiam elatior* (the broad-base of frond) et botrus *racemosior* (which also is the case in several of my specimens), in my judgment more closely agrees with Bot. Lun. var. cristatum Kin. than with Botrychium Rutaceum. Again, the plant seems to have occurred amongst the ordinary form, but sufficiently rarely to call for comments, all rather pointing to a variety than to an undoubted species, which, if it had occurred so frequently as Ray's plant appears to have done, ought to have fallen since then under notice of some of our botanists, and Smith, from his notice, does not appear to me to have met the plant, as, had he met only the perfect form of this variety, it is too remarkable to have been passed over without description; and had he met the intermediate forms, he certainly would have mentioned so strong a proof as they would have afforded of the specific identity of the two forms. I know that these latter objections may also be urged against var. cristatum; but still that Ray actually saw or knew of Doody's plant is unmistakeable, and it seems more likely to have been merely a variety of plant known to exist in England in quantity, than a plant of whose occurrence we have no proof, if we except Mr. Cruickshank's specimen of monstrous growth from Dundee (Brit. ferns, page 323), and these are too much deformed to enable us to form an opinion with any degree of certainty.

These arguments are not for one moment to be supposed to be directed against the existence of Botrychium rutaceum as a species, but merely to prove that Doody's plants and these now exhibited were probably the same. If so, it is interesting to find a form apparently lost for so long re-appearing at a distance from the original localities.

The other forms which are now exhibited illustrate all the varieties of form which appear in the fern with which I am acquainted. They are, in addition to the ordi-

nary form, specimens of the laciniate form of the plant, which is a true variety referable to the class laciniatum; and the sub-variety multifidum exhibited in the barren branch, which appears to be rather rare, though the same sub-variety is common enough in the fruitful branches; and they illustrate well the danger of founding a species on character drawn from the mere circumscription or cutting of fronds. It is singular to find so many varieties of form all crowded together in one small locality.

The point of whether this plant is truly a plant parasite or not has engaged my attention, and the only conclusion I can come to is, that there is no actual connection or contact between it and the plants among which it is found; which is the more strange, as it is evident from the nature of the localities in which it grows, and from the testimony of all the most successful cultivators of the plant, that it will not subsist unless amongst grass. Mr. Wollaston, than whom I know of none more competent to offer an opinion on any subject connected with the growth of ferns, has told me that he finds that to keep the plant over the second year, it is absolutely necessary to grow it in a tuft of grass, and yet that he has never, even after the most searching examination, by washing out the soil from the roots of plants, succeeded in tracing any connection between the plants; so that this must, I fear, be, for the present, classed among those botanical puzzles which have baffled all our efforts for their unravelling. In conclusion, let me urge on every botanist who has the chance of studying this plant to never let slip an opportunity of doing so, for, owing to the short time of the year during which these observations can be prosecuted, one golden opportunity lost may never occur again.

Mr. Andrews, Honorary Secretary, then read the following

ON THE OCCURRENCE OF GONEPTERYX RHAMNI AND THECLA BETULÆ IN KERRY.

It is unnecessary to give any description of either of these beautiful species, as they have both been frequently figured and described in many histories of British lepidoptera.

The first, the brimstone butterfly (G. Rhamni), is an insect abundant in the southern counties in England, scarce in the midland, and not found in the northern, or Scotland. It is not so easy to speak with certainty of its occurrence in this country, as, unfortunately, there is a great dearth of records of entomological research here. It may, however, be assumed to be a rare and extremely local insect, and we find no record of its appearance in any quantity, or with any regularity, which is rather remarkable, as, in the sister country, it is one of those insects which, though local, when it does appear is found in numbers, and also annually. Last year, however, in the month of August, in a secluded part of Muckruss, Killarney, in one of those tortuous mountain paths screened from the breeze, amidst the bright rays of an autumnal sun lighting up the sprays of the buckthorn and honeysuckle, the brimstone butterfly might be seen in numbers basking in the sun's glare, or gaily flitting around with their beautiful sulphur-coloured wings. Occasionally, as though for the sake of the contrast, they would alight on the blue flowers of the field scabious (Scabiosa succisa), and quietly closing their wings, allow themselves to be captured, a habit very different from that of the beautiful red admiral and peacock butterflies (Vanessa Atalanta and Io,) with which it was in company, and which might be seen, on the other hand, when alighting, open fully out their wings, as though proud of their gay colouring. The same habit is also seen in the painted lady (Cynthia cardui), whose favourite plants are the yellow flowers of the ragwort (Senecio vulgaris).

Near the same locality the brown hairstreak (Thecla betulæ), a rare insect in Ireland, a single specimen, was met with. The common gamma moth (Plusia gamma) also made its appearance in great numbers in September last. During the previous summer its larvæ had proved very destructive to the peas and beans.

Mr. Andrews illustrated his remarks by specimens of the insects referred to.

Mr. E. Percival Wright, Secretary of the University Zoological Association, had met Gonepteryx Rhamni in the county Dublin. Although a scarce insect in

the midland counties, he thought it was not rare in the south, and where it occurred it was generally in great abundance. The capture of Thecla betulæ was of great interest, as it had been inserted in Mr. Greene's Irish list, with a query, and even in England it was of rare occurrence.

Mr. James Haughton, jun., had also met it near Roebuck, county Dublin.

Mr. R. P. Williams thought that the occurrence in numbers of the brimstone butterfly in Killarney was a matter of great interest, as this butterfly may be looked on as one of the rarities of the collector's cabinet. In the Dublin collections he was only aware of two specimens, one in his own, collected by the late Cooper Haffield, Esq., and one or two in the collection of the late Mr. Tardy, now in the possession of Trinity College. Both these gentlemen were frequent companions in entomological excursions, and the impression on his mind was, that all the specimens alluded to had been captured in the Vale of Avoca, which, at the time when the collections were made, was thickly wooded with large trees, the underwood abounding in the common buckthorn (Rhamnus frangula), which is one of the trees on which the caterpillars of this moth chiefly feed.

The ballot having closed, the chairman declared the following gentleman duly elected as an ordinary member:—John Irvine Whitty, LL.D., M.R.I.A.

EXTRA POPULAR MEETING.

The third and concluding of this series of meetings was held on Thursday evening, June 25, 1856,

JOHN ALDRIDGE, M.D., M.R.I.A., in the Chair.

Doctor C. Farran gave a long and exceedingly-interesting paper on the mollusca of Ireland, in which he detailed, in a graphic manner, the more remarkable of his discoveries among these animals—viz., Pholas papyracea, Teredo norvagica, Fusus antiquus var. carinatus, and others of great interest, illustrating his remarks with a splendid series of shells, and in the conclusion of his paper adverted to the dredge as the greatest help the conchologist can possess.

DUBLIN UNIVERSITY ZOOLOGICAL ASSOCIATION.

FRIDAY, FEBRUARY 15, 1856.

R. BALL, LL.D., President, in the Chair.

The following donations to the library were acknowledged, and thanks ordered to be given to the donors:—"The Geological Observer," by Sir Henry De la Beche, presented by J. Beete Jukes, Esq.; "Guide to the Museum at Kew," by Sir W. J. Hooker, by E. Percival Wright, Esq.

The following extracts from a letter from J. C. Dale, Esq., corresponding member, were then read:—

NOTES ON BRITISH INSECTS.

Dates and localities of capture of some rare bees, in addition to those given by Mr. Smith in his list of British bees:—*Halictus quadricinctus*, August 29, 1828, on rock under cliffs, Isle of Portland. *Andrena hattorfiania* (olim *hæmorrhoidalis*), July 9, 1830, a single specimen between Teignmouth and Dawlish; Captain Blomer had taken several previously not far from Mainhead; Mr. S. Stevens also took it in 1848 in a clover field near Buckland Wood, Devon. *A. angulosa* K. (which Mr. Smith gives as the male of *A. helvola*), taken by Mr. Serrel, end of July, 1832, on Mount Barule, Isle of Man. *A. nigriceps*, two females found in a gravel pit between West Hurne and Parley Heath, July 12, 1823; and a few in sandy places at Bournemouth, Hants, June 19, 1846. *A. aprilina*, flying over

hedges, also on dandelions, at Glanville's Wootton, April and May, 1856; some of them stylopized. *A. schrankella;* middle of August, 1824, in plenty on flowers of Scabious, by the Moores river at West Hurne, Hants; has not occurred since. *A. analis*, in various years, 1823, 1835, 1842, 1845, between the middle of June and middle of July, at Parley Heath and West Hurne Heath; Elsington Wood and Knighton Heath, Dorset, and in gravel pits by Holnest and Holm Bushes, about three miles from Glenville's Wootton. *A. separata* (probably only a variety of *A. labialis*), May 12, 1827, at Charmouth, not stylopized; *A. labialis*, which is found at Glanville's Wootton, produced Stylops dalii, which has the base of the wings quite clear. This is not the case in the Stylops produced from *A. convexiuscula* (formerly considered as *barbilabris*), which I have always found more or less stylopized. *A. argentata*, first at Lancross, near Bideford, Devon, July 20, 1830; afterwards in plenty on Sands, Bourne and Boxcombe Chines, August 19, 1845.

Nomada baccata, Bournemouth and Ramsdown, August, 1835. *N. roberieotana*, on hawkweed, near Parley Copse, June 27, 1823; Elsington Wood, Dorset, July 4, 1845; Holnest gravel pits, July 18, 1832.

Megachile circumcincta, Parley Heath; received also from Newcastle, G. Wailes, Esq. *M. leachella*, Portland and Bristol.

Cœlioxys rufescens, on a mud wall at Stilton, Hants. *C. vectis*, Isle of Wight and Isle of Portland.

Osmia bicolor, Cranborne Chase, Dorset, and Bristol.

Mr. E. Percival Wright read the following notes on a

DISEASE ATTACKING THE MINNOW.

Not long since a friend of mine brought me a specimen of a minnow (Leuciscus phoxinus) which presented a very remarkable appearance, being covered all over with minute black spots, which, on a casual glance, looked tubercular: you are, doubtless, aware that in this genus (Leuciscus) the surface is nearly smooth, the scales being very small; the general colour of L. phoxinus being dusky olive, and somewhat mottled. This specimen had been placed along with some gold fish from the Victoria regia house, Glasnevin, in a small aqua-vivarium, and was constantly fed upon flies. After a short time it appeared restless, and every now and then it came up to the surface of the water, gasping for breath; every day seemed but to increase the little minnow's troubles, and its efforts to breathe seemed constantly on the increase, as it every moment swam to the surface; and the incessant muscular efforts of the gills must have been most troublesome, and shortly became such that the fish flung itself out of the water, and very soon ceased to breathe. The following morning I examined it, and found it completely covered over with these small black spots. They did not rise above the surface, but were small and well defined in outline, the smallness of the scales making them more apparent. When examined under the microscope, with a one-fourth inch of Ross, these spots had all the appearance of large pigment cells—fine veins of a dark carbonaceous looking matter radiating from a centre, and were deposited between the skin and the muscular structure. Upon dissection, I found the branchiæ of the gills gorged with this peculiar deposit, some of them beautifully injected, others plugged up with small particles. Part of the stomach was also discoloured; but, with the exception of this abnormal secretion, there was nothing else to account for death.

A good deal has been written upon the diseases to which fish when kept in confinement are liable, but I am not aware that this remarkable one has been observed or recorded before. I have little doubt that it resulted from the long continued feeding upon the same sort of food, and that a change of diet would have obviated the evil consequences. But I would not like to say whether it died altogether from the effects of asphyxia, the branchiæ being rendered impermeable to air; or whether, if this had not been the case, it would not have died from the effects of the extensive blood poisoning, as manifested in the sudden effusion of this foreign substance throughout the surface of the skin.

Would a specific poison have the same effect upon a cold blooded as upon a warm blooded animal; or was the deposit the same which infiltrated the lung tissue and appeared in blotches upon the skin?

Dr. Neligan called attention to the strong analogy that existed between this instance brought forward by Mr. Wright and the disease called purpura in badly-fed people, whose diet had been confined to any one article of food.

FRIDAY, APRIL 18, 1856.

R. Ball, LL.D., President, in the Chair.

Mr. Haliday gave a sketch of the present state of knowledge of the Organization, Classification, and Natural History of the Rotifera, illustrated by Diagrams of some of the principal forms. The recent studies of Leydig and Vogt, Huxley and Gosse, &c., were noticed; especially regarding the arrangement of the nervous system, misapprehended by Ehrenberg; the number and structure of the eyes, where they exist; the system of circulation; the existence of distinct sexes, and the peculiar differences of these, which, before they were rightly appreciated, gave occasion to the formation of some genera and species which must now be suppressed.

Dr. Ball exhibited living specimens of the Burrowing Urchin (Echnus lividus), which were sent to him from the coast of Mayo, by Mr. Richard Glennon, the well-known bird preserver. Dr. Ball having pointed out the peculiarities of this species, and stated that in 1838 he had been requested to institute experiments, with the view to ascertain the method by which it excavates its remarkable basins in the hard limestone of the Arran islands, and the still harder slates of the County of Clare, added, that, with the view to having the matter under his own eyes, he had imported a number of living specimens, and placed them at Kingstown, where he thought they had all perished, apparently from silt. He stated that his experiments had not any satisfactory result, and that to him the power exerted by this animal was still a mystery. He mentioned that it is found on soft slate in Cork, and on granite in Mayo; and it does not burrow in either case; while in some localities it contrives so to modify the growth of Nullipores or rocks, as to give it the protection it obtains in other places by burrowing. Dr. Ball exhibited one specimen from the coast of Clare, in which the burrow, a hemispherical cavity of about two inches in diameter, was in a hard state; into this cavity projected a fossil, still harder than the slate, but probably not more silicious; this would argue in favour of mechanical agency, but still a slight difference in chemical constitution may be the cause. Dr. Ball observed that non-excavating specimens had longer and more slender spines than those which excavated, and that in the colouring, varying from fine purple, through shades of brown, to sordid green, there appeared no rule, specimens of the different colours being intermixed.

Dr. Ball exhibited the fine specimen of Sciæna umbrina, obtained many years ago by Dr. Joshua Harvey, of Cork, who had kindly lent it to have a model made of it for the collection of Irish Ichthyology, in progress in the University Museum. It will be recollected that of this fine fish the specimen in question is the only Irish example.

FRIDAY, MAY 16, 1856.

R. Ball, LL.D., President, in the Chair.

The following donations to the library were acknowledged, and thanks ordered to be given to the donors:—"The Flowering Plants and Ferns of Great Britain," at attempt to classify them according to their Geognostic relations, by J. S. Baker, presented by E. Percival Wright, Esq.; "Mudie's British Birds, 2 vols., coloured plates, by W. R. Tagart, Esq.; Kirby and Spence's "Introduction to Entomology," 7th edition, and Burmeister's "Introduction to Entomology," by A. H. Haliday, Esq. V.P.; "History of the British Diatomaceæ," by W. Smith, Esq., by the Author.

A. H. Haliday, Esq., read the following letter from J. C. Dale, Esq., F.L.S., corresponding member, on rare Diurnal Lepidoptera of Britain, in particular on *Mancipium Daplidice* and *Argynnis Lathonia*, and the ancient and modern instances of their capture in England, which are authenticated by trustworthy evidence. Also on the circumstances under which some N. American species have found their way into collections and lists of British Lepidoptera.

A. Furlong, Esq., read the following paper, by the Rev. A. R. Hogan, in the absence of the author :—

FIRST SUPPLEMENT TO THE CATALOGUE OF COLEOPTERA FOUND IN THE NEIGHBOURHOOD OF DUBLIN.

I have great pleasure in laying before you this first regular addition to the records of our Dublin Coleoptera, and I hope it may be the first annual one, as there is every probability of there being sufficient materials for some years to come. To give such a list periodically would have many advantages; drawing attention more constantly to the subject, and regularity being, to a certain extent, a safeguard against errors. So I repeat the earnest hope that, if I be not myself on the spot, of which there is but little probability, some patriotic member will systematically compile each year a notice of what the exertions of the past year have produced. Most of the species here enumerated were captured last spring, and of some of them specimens have already been exhibited to the Association; they are about thirty in number, and the greater part of the additions are due to the energetic zeal of our member, Dr. J. R. Kinahan. Mr. Haliday and Mr. E. Percival Wright have added several, and a very few of the novelties occurred to my own observation. Among the rest, the beautiful Xantholinus tricolor, and the interesting Aëpus manrius, are now known to be within the reach of our home collectors.

Leistus fulvibarbis, *Dej.* Dundrum; two specimens.
Calosoma inquisitor, *L.* Powerscourt, Mr. A. Furlong; recorded in Stephen's Manual, but by some oversight omitted from the catalogue.
Patrobus rufipes, *F.* Dr. Kinahan.
Stomis fornicatus, *Pz.* do.
Bradycellus collaris, do.
Elaphrus riparius. Mr. Haliday—Zoological Gardens, Phœnix Park.
Bembidium obtusum, *Sturm.* Dr. Kinahan.
,, flavipes, *L.* Banks of Dodder, near mouth.
Aëpus marinus, *Strom.* North Bull sands—Mr. John Grainger.
Dytiscus punctulatus, *F.* Firhouse.
Hydroporus septentrionalis, *Gyl.* In the Dodder.
Hydræna riparia, *Kug.* Same locality.
Helophorus dorsalis, *Ste.*? Do.
Geotrupes vernalis, *L.* Howth, &c.
Athous niger. Ireland's Eye.
Corymbites cupreus, *F.* Dr. Kinahan.
Læmophlœus pusillus, *Shon.* In grain, &c.; imported.
Carpophilus hemipterus, *Ste.* Charlton, Roebuck; in rotten wood.
Phyllobius parvulus? Dr. Kinahan.
Salpingus planirostris, *Ste.* Charlton.
Haltica Euphorbiæ, *F.* Portmarnock.
Coccinella undecimpunctata.—Portmarnock; abundant—Mr. E. Percival Wright.
Philonthus cephalotes, *Grav.*? Charlton.
Xantholinus tricolor, *F.* Killiney Hill.
Olophrum piceum, *Gyl.* Near Crumlin.
Bolitochara fungi, *Ste.* Mr. E. Percival Wright.
,, quisquiliarum, *Ste.* Mr. E. Percival Wright.
Bryaxis juncorum, *Leach.* Sandy bank of Dodder, near Firhouse.

Lesteva punctata, *Ecr.* In moist gravel of Dodder bed, along with L. tricolor (obscura).
Tachyporus pyrrhopterus, *Ste.* Mr. E. Percival Wright.
Stenus bimaculatus, *Gyl.* Dr. Kinahan.

NOTES ON IRISH DIPTERA.

Mr. Haliday read a notice of two dipterous insects which occur in Ireland, in the hope of exciting some of the members of the association to further observation, which might clear up several points as yet doubtful concerning them.

1st.—*Clunio marinus.* The first published notice of this genus appeared in the proceedings of the association (see Natural History Review, Vol. 2; Proceedings, p. 62). Mr. Haliday had lately heard from Dr. Schiner, of Vienna, that he had obtained a second species on the coast of the Adriatic (*C. adriaticus*, Sch.), the description of which would soon appear in the transactions of the Zoological and Botanical Association of Vienna. Mr. Westwood had observed *C. marinus*, as he believes, on the coast of Devon; and it may now be added to the list of Dublin insects, a specimen having been found a few days before floating drowned on the sea water from Dublin Bay, with which the Aquaria in the Society's rooms were freshly replenished. The female is as yet quite unknown, and the attention of the members has been drawn to this, in hopes that this gap in the natural history of the genus might be supplied. (Since this notice was read the male has been found alive on the coast near Baldoyle, within eight miles of Dublin, but outside of Dublin Bay.)

2nd.—*Orphnephila testacea.* Much doubt appearing to prevail as to the affinities of this genus, which Professor Rondani has even proposed to constitute the type of a distinct family among the Nemocera, Mr. Haliday invited the attention of the members to the investigation of its earlier states, concerning which there exists as yet no information. He submitted to the meeting some notes and sketches of the internal anatomy of both sexes, made many years since; see plate 2 of this volume, and the explanation.

The following were elected members:—Honorary member, George Gulliver, F.R.S. Ordinary members, H. C. Beauchamp, M.D., T.C.D.; Rev. Eugene O'Meara, A.M., T.C.D.; Edward Wright, Esq., LL.D., T.C.D.

FRIDAY, JUNE 27, 1856.

R. Ball, LL.D., President, in the Chair.

The following donation to the library was acknowledged, and thanks ordered to be given to the donor:—"Woodward's Manual of Mollusca," by W. R. Tagart, Esq.

Read, from J. C. Dale, Esq., corresponding member, Extracts from his Entomological Diary of earlier years. The first Entomological visit to Whittlesea mere; *Lycæna dispar* and other rarities of that district. Researches in the footsteps of Dr. Abbot. *Hipparchia Cassiope*, on the hills near Ambleside, &c.

E. Percival Wright, Esq., read the following note on the occurrence and distribution of

ANTHROCERA MINOS.

I was anxious to obtain some information respecting our new Irish moth (Anthrocera minos), and therefore did not hesitate to accede to Dr. Carte's (the director of the Museum of the Royal Society) request to collect some specimens for his museum cabinet of British Lepidoptera. I left Dublin about the 17th of June, and took up my head-quarters at Kinvara, a seaport town in the county of Galway, not many miles from Gort.

Mr. Moore, in recording the capture of the species, says, "It occurs in abundance at Ardrahan, and I have traced it as far as Tyrone on the sea coast." Now, as Tyrone was somewhat nearer to Kinvara than Ardrahan, it occurred to me that it would be better to commence my search there, which I accordingly did, and

minutely examined all the ground between Kinvara and Tyrone for two whole days, without meeting a single specimen of Anthrocera. It was too early in the season for A. filipendulæ ; the cocoons of which insect were, however, pretty abundant. During the entire of these days I wandered from field to field, expecting every moment either to see A. minos, or, at least, to find some ground that would be likely to be inhabited by it. But all the fields were either under cultivation or consisted of poor pasture land, closely eaten by the cows and goats of the inhabitants. The large blocks of limestone with which they were all, more or less, densely strewn, being covered by ivy or by the loosely-trailing bramble. Polyommatus alsus and Pamphila linea were flying about by the roadside and hedges in tolerable abundance. At the beginning of my third day's search it became quite apparent that I was not in the proper locality, and I determined to go to Ardrahan at once. I spent the better part of a day there, but without the smallest success. As the day waned, I made up my mind that the excessive backwardness of the season must have affected the little minos ; and, though somewhat disappointed, I resolved to leave Galway that evening and re-visit this locality still later in the spring ; but on my way back to Kinvara I, at last, entered a large field which was overgrown with Arctostaphylos uva-ursi, Dryas octopetala, Sesleria cœrulea, Gentiana verna, and other plants, at the sight of which I felt quite sure that if A. minos had seen this year sunshine it was not very far from me now : and so it happened ; for, while stooping to gather the pretty Dryas octopetala, an A. minos lighted quite passively on the flower, and was, in a very brief moment, transferred to my collecting-box. All my disappointment was now over ; for in the brief space of three or four hours I collected a very fair stock of specimens. When tired of this sport, and having secured all that I thought requisite to gratify my friend the director of the Museum of the Dublin Society, I proceeded to investigate the habitat of the insect, and with the following result. I observed that wherever the A. minos was to be found, there the plants that I have particularised were to be found also ; and so remarkable was this love of locality, that I did not find this insect either near Kinvara or Tyrone, but only in a few fields about Ardrahan. It is quite possible that later in the season it will spread itself much more widely ; for, when I found it, it could have emerged from its pupa state but a very brief time, none of the specimens being rubbed in the slightest degree. Whether this species would become extinct if its favourite plants (for I am inclined to think that the finding these plants and insects together is something more than accidental, and there is an apparent necessity of the former to the latter) were destroyed by the advance of cultivation, may for some time remain a query. I fear, however, it would be the case ; nor do I think it at all likely, as some English entomologists hint, that it will be found in any parts of England except introduced ; and, even then its existence will, in all probability, be the lifetime of a day. One of its chief food plants is Polygala vulgaris (it is called *Polygalæ* by Borkhausen). This plant grows in the greatest abundance in all the fields here, and seemed to be fed upon by its larva. At the same time, it is most probable that it feeds on various other plants, as, if we can judge from M.M. Schiffermuller and Denis's account, it would not seem to be very particular. The perfect insect differs slightly from the figures of continental specimens, but by no means so much as often exists between the same species when found on continents and islands, or even as much as our Silpha atrata differs from English examples. Anthrocera minos was first characterized in 1776 by the authors of the " Systematic Catalogue of the Lepidoptera of the Country about Vienna (Schiffermueller and Denis, Professors of the Theresian Institute), and has been often confounded, and even by Fabricius himself, with A. scabiosæ ; while some have applied the name minos to the last. " The caterpillars," say the authors above mentioned, " feed on clover (Trifolium), Veronica officinalis, Biza minor, Cynosurus cristatus, Genista tinctoria, and Thymus serpyllum ; it is like that of A. scabiosæ, but is pale yellow (not golden yellow, as that), with two rows of twelve black spots. The cocoon is very convex, and of a brownish-yellow colour ; the pupa black brown on the head, wing sheaths, and back, elsewhere yellowish. The fly appears in three weeks, and is on the wing from the end of June on to August, in most parts of the continent of Europe." It

appears about a fortnight earlier than A. filipendulæ. At least two dozen of the cocoons of the latter changed about fifteen days after I first took minos, and with one solitary exception minos was the only Anthrocera I saw while in Galway.

The following trivial names are given by Ochsenheimer as synonyms of Zygæna (Anthrocera) minos:—

Zygæna pythia. *Fabricius;* do. *Panzer* (confounds with Z. scabiosæ) *Vieweg.*
,, pilosellæ, *Borkhausen; Schranck; Esper; Ernst.*
,, polygalæ, *Borkhausen; Esper*—A marked variety, in which the red spots run together, and fill nearly the whole wing.
,, Viciæ, *Lang.*

Sphinx purpuralis *Mueller* Prodomus Zoologiæ Danicæ, A.D. 1776, is also cited as comprising both *minos* and scabiosæ; but, as he cites Schæffer's figure of the latter, the application is best made to this, of which *purpuralis* would be the *earlier* name. I have to thank Mr. Haliday for information regarding the Synonymy.

Professor Melville, M.D., M.R.I.A., then made the following observations on the occurrence of

STEPHANOMIA CONTORTA, MILNE-EDWARDS? AND AGALMA GETTYANA, HYNDMAN? —ADDITIONS TO THE BRITISH FAUNA.

It becomes my pleasing duty to exhibit to the members of this Association the accompanying drawing of two Acalephæ, both of them additions to the British Fauna (*vide* Plate vii.). You are, doubtless, aware that there are both simple and compound Medusœ.

Of this latter class few are on record as frequenting the British seas, and it remained for the energetic zeal of our own Irish naturalists to draw these forth from the bosom of the ocean and to introduce them to the notice of the British naturalist. The first (Fig. 1, Plate vii.) was discovered in Kingstown harbour about the 2nd of June last, by one of the honorary secretaries of this association, Joseph Greene, Esq., a gentleman whose never-tiring energy in the cause of our marine zoology; whose attentive memory and quick eye will let but few of nature's secrets pass by him; and who, I doubt not, if his life be spared, will much advance our knowledge of Irish zoology. The other (Fig. 2, Plate vii.) was discovered in August, 1841, by Edmund Getty, Esq., of Belfast—a name well known to you all, whom it would be quite unnecessary to panegyrize. I will call your attention to the former one first. It belongs to the genus Stephanomia, of Peron, and I am inclined to refer it to the "contorta," Milne-Edwards, a species found by him at Nice. His opportunities of examining this animal would appear to have been but few, as it did not occur to him in any great numbers; it is furnished with a small oval sac (*vide* Plate vii., *a*, and Plate vi.; 3 magnified view), which is filled with air, and has the appearance, when the animal is alive, of a globule of quicksilver, and the slight inequalities of its surface reflect the light in such a manner that it often looks as if a fine network of veins, filled with a crimson coloured fluid, ramified over its surface. By the aid of this closed sac, no matter what position the Stephanomia assumes, it is always sure of coming up to the surface with its "head" foremost.

Next we observe a small number of organs clustered around the common tube (*vide* Plate vii., *b*, and Plate vi.; 3 magnified), and on watching them closely we perceive in each of them every now and then a gentle pulsating motion, caused by the taking in and rejection of the water. These organs would not appear to act necessarily in unison; but one side, or one set, acting more vigorously than the other, sways the compound body, now hither, now thither. These are the organes natatoires of Milne-Edwards; and I am of opinion that their number varies, according to circumstances. The slightest touch given to the organe hydrostatique, or air vessel, set these swimming bladders in motion, and they at once begun to pulsate, until, finally, the whole living mass settled quietly at the surface again.

Extending from the air-cell to a distance, in this specimen, of—when quite expanded—some six or seven inches, was the common stock or stolon, a hollow tube, capable of considerable contraction, and coiled up on irritation in the spiral form figured in Milne-Edwards; to this, and in close proximity to the air-cell, the

swimming organs were attached; and at various intervals throughout its length the polypiform zooids were fixed, often in little assemblages of threes and fours, each covered at its base by a foliolum—the rudiment of the disk in the ordinary monogastric medusæ. Within the mouth, when contracted, ciliary motion was very apparent, and at the base a simple tiliary apparatus appeared. The polyps were found in various stages of gemmation. Ova, in clusters, were seen pullulating from the common tube, and spermatic sacs were also observed, but only after their detachment. From the base of the polyp proceeded a long, highly retractile thread, or fishing-line, with secondary branches, the extremities of which were thrown into short spirals of three or four coils, immediately before terminating. These threads often exceeded in length the whole Stephanomia, and were capable of being thrown into the most beautiful and graceful convolutions—now bent at right angles, and again thrown out in a series of light, airy-looking arches.

The spirals in the live Stephanomia were just visible to the naked eye, and were of a dark sherry colour, owing to the presence of pigment in the cells.

The minute structure of these spirals was then alluded to.

Oval sacks of stinging filaments attached by spirally coiled peduncles were found after the animal had broken itself up; but their relations could not be determined. (*Vide* Plate vi., Fig. 4).

After other details, the accordance of the facts observed with the views of Huxley and others as to the nature of these compound organisms were pointed out.

But one perfect specimen was taken (another a good deal mutilated occurred), and the weather had been for some time hot and sultry; the sea was quite calm at the time. It lived in a large globe of salt-water for several days, and was a most striking and beautiful object; it generally lay quite upright in the water, the slightest ripple upon the surface of which set it in motion; and immediately coiling up its fishing-lines, and shortening the length of its stolon by about one-third, it threw its set of little balloons into strong pulsations, until, weary of descending, it submitted to be guided by its brightly glittering head, and soon ascended to the surface. When subjected to examination it soon died, and was not long until it had completely broken itself up. In company with my friend, Mr. Wright, I spent several hours in examining it; but its minute details would require the examination of many more specimens ere I could give anything like a clear account of them. I trust the energy of Mr. Green will yet cause him to discover other specimens, when I will be enabled to complete my dissections.

For an account of the second Acalephe (*vide* Plate vii., Fig. 2), I am indebted to the kindness of George Hyndman, Esq., of Belfast. It was taken by Edmund Getty, Esq., on the 15th August, 1841, floating in great numbers on the surface of the sea (in Belfast Bay) during a calm, with warm sunshine. Their long tentacula were extended horizontally on or near the surface, having the appearance of strings of beads. Four or five living individuals were brought to Mr. Hyndman, all of which remained suspended by the upper vesicle, occasionally extending their tentacula, and suddenly drawing them up. The body of the animal was of a grayish colour, with spots of reddish brown on the central tubular portion and on the top of the air-vesicle. The knobs on the tentacula were of a yellow colour. After one night's captivity in a glass vase, all the specimens but one were dead, and sunk to the bottom. The remaining one continued alive for two days. This animal was named by Mr. Thompson, Agalma Gettyana, after its discoverer. The specimen as figured wants, for the most part, the swimming organs; but these were, doubtless, rubbed off. In July, 1852, a great many of this species were found floating in Belfast Bay; but the current was so strong that Mr. Hyndman was unable to get any without being injured. I hope that further investigation may yet enable our Irish naturalists to clear up many doubtful points in the history of Acalephe.

In conclusion, Dr. Melville stated that in his opinion these two medusæ were specifically identical.

After some remarks from the President, suggesting various objects of research for the members of the association during the long vacation, the members adjourned until Michaelmas Term.

W. R. T.

DESCRIPTIONS OF PLATES.

PLATE 1.—VOL. III.

ILLUSTRATIVE OF A PAPER BY A. H. HALIDAY, Esq., ON PULÆX.

Fig. 1. Dorsal half-ring of an abdominal segment of *Pulex canis*, with the spiracle.

„ 2. The mesothoracic spiracle of the same.

Vide Proceedings of Societies, page 9.

The remaining figures, of a Paper on Larva infesting the Horns of Oreas Canna, &c.

Fig. 3. Horns of Oreas Canna, with Cocoons of Lepidopterous Larva.

„ 4. Larva—natural size. ... ... 5. Magnified side view.

„ 6. Skin of Larva stretched.

„ 7. Prothoracic spiracle.

„ 8. A Leg.

„ 9. Hamuli of one of the abdominal prolegs.

„ 10. Last segment from above. 11. Side view. 12. From beneath.

„ 13. Head from above. 14. Same from beneath.

„ 15. Mandible from outside and from within.

„ 16. Labrum.

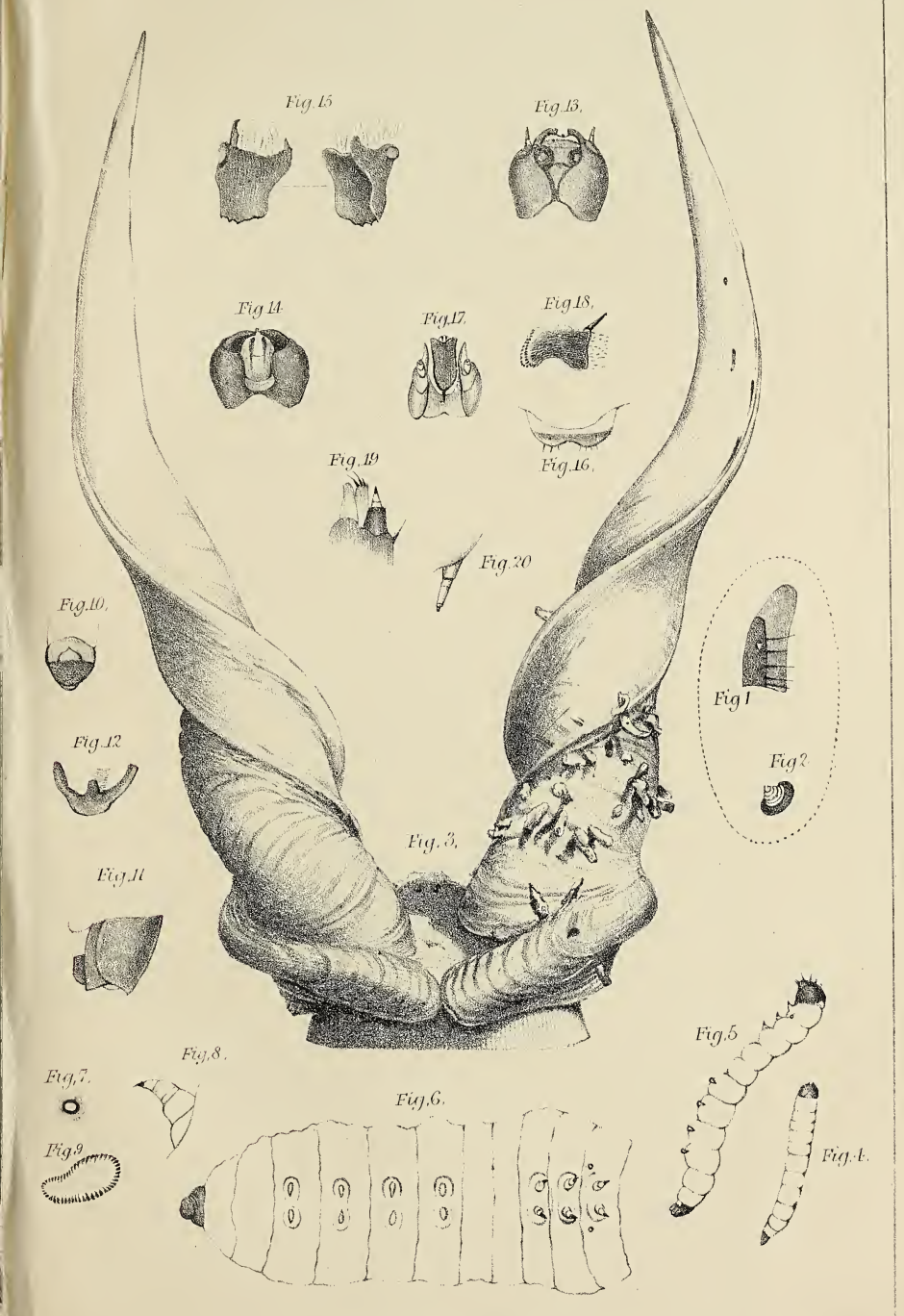
„ 17. Maxillæ and Labrum in position.

„ 19. End of Maxilla and Palpus.

„ 18. Labium from the side.

„ 20. Antenna.

Vide Proceedings of Societies, page 23.



Forster & Co. Lith. Dublin.

PLATE 2.—VOL. III.

INTERNAL ANATOMY OF ORPHNEPHILA TESTACEA, ILLUSTRATIVE OF A PAPER BY A. H. HALIDAY, Esq., ON IRISH DIPTEROUS INSECTS.

Fig. 1. The principal nervous chain. A. Supræsophagian ganglion. Z. Terminal ganglion. Y. The last internode, bipartite.

,, 2. Principal viscera of the male, with the head C, and forceps Z, viz.: E. Æsophagus. V. Ventricle. O. Malpighian vessels. T. Small intestine. R. Colon. P. Side stomach. G. Testes; the lower half, as well as the connecting cord, and the Deferents enveloped in a black pigment, easily rubbed off—as shown at the upper part of the Deferents. V. Vesicles.

,, 3. The side stomach, variable in form according to the degree of repletion.

,, 4. Vesicles of male, more magnified; with the hooked outlet of the Deferents.

,, 5. An outer, and—6, an inner arm of the forceps.

,, 7. The abdominal viscera of ♀ seen in situ, the large ovaries nearly concealing all the rest. O. Malpighian vessels. M. Follicles of the oviduct. Z. End of abdomen and tentacles.

,, 8. Tentacles of female from above.

,, 9. One of them, side view.

,, 10. Reproductive organs of female. O. Ovaries composed of numerous eggsheaths, each forming an oblong bundle. M. Follicles.

,, 11. M. The follicles. D. Their outlets enveloped in a grape-like mass, and beset with pear-shaped black villi, easily detached.

,, 12. Common oviduct, with the Spermotheca, and the outlet of the pair of separate oviducts enlarged below the grape-like envelope.

,, 13. Spermotheca apart.

,, 14. Portion of one of the separate oviducts with some of the villi.

,, 15. Portion of ovary showing the branching of the egg-sheaths.

,, 16. A single egg-sheath, of four chambers, and terminating in a very short filament.

Vide Proceedings of Societies, page 71.

Fig. 9.

Fig. 8.

Fig. 7.

Fig. 1.

Fig. 3.

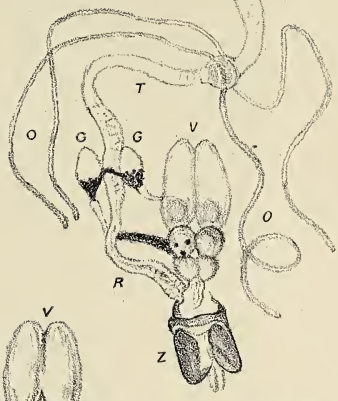


Fig. 2.

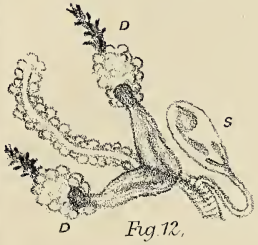


Fig. 12.

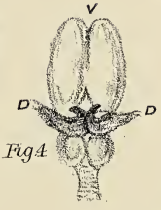


Fig. 4.

Fig. 5.

Fig. 10.

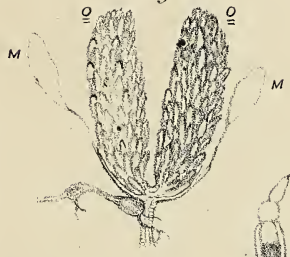


Fig. 6.

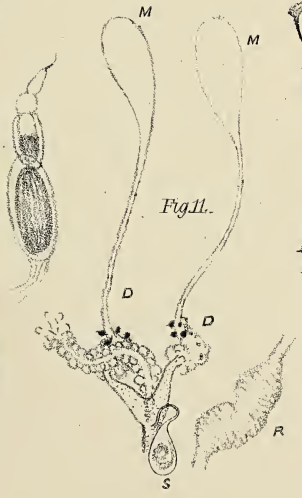


Fig. 11.

Fig. 16

Fig. 14.

Fig. 15.

Fig. 13.

PLATE 3.—VOL. III.

ILLUSTRATIVE OF A PAPER BY DR. JONES LAMPREY, 15TH REGIMENT, ON THE VEDDAHS OF CEYLON.

Fig. 1. From a Photograph of a Veddah.
„ 2. Skull of a Veddah.
„ 3. Irish skull of Fir Bolg descent.
„ 4. Recent Singalese skull.

Vide Proceedings of Societies, page 27.

PLATE 4.—VOL. III.

Chart shewing the coast discovered by Commander F. L. M'Clintock, with his track in search of Sir John Franklin's Expedition, 1853; in explanation of Extracts from Captain M'Clintock's Diary.

Vide Proceedings of Societies, page 40.

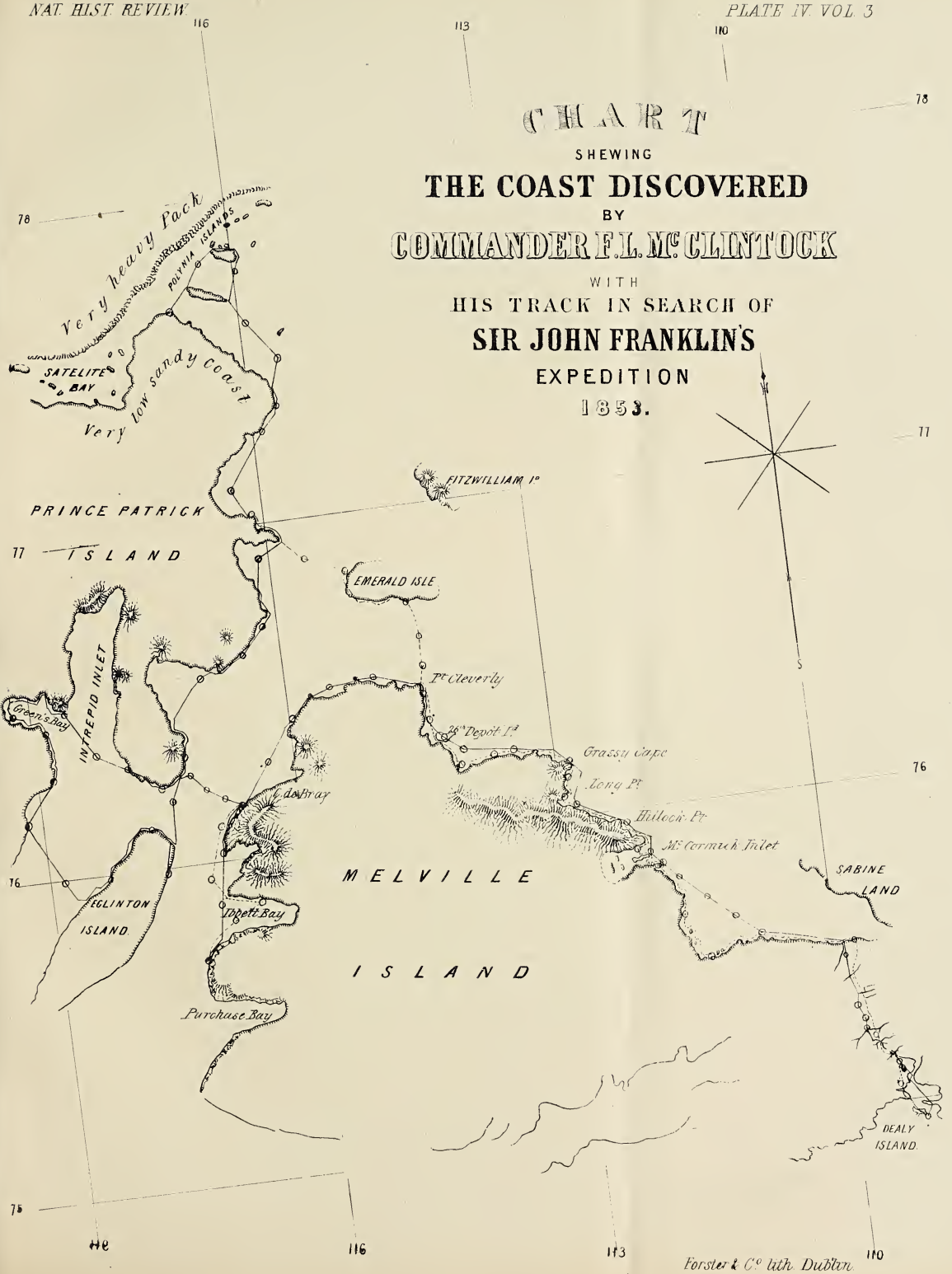
Fig. 2.

Fig. 1.

Fig. 3.

Fig. 4

Forster & C°lith. Dublin



Forster & Co. lith. Dublin

PLATE 5.—VOL. III.

ILLUSTRATIVE OF A PAPER BY DR. J. R. KINAHAN, ON BOTRYCHIUM LUNARIA, AND ITS VARIETIES.

Fig. 1. Botrychium lunaria var. cristatum, *Kinahan*.
„ 2. Do. do. common form.

PLATE 6.—VOL. III.

PARTLY ILLUSTRATIVE OF DR. J. R. KINAHAN'S PAPER ON BOTRYCHIUM LUNARIA, AND ITS VARIETIES.

Fig. 1. B. lunaria var. cristatum, *Kinahan*, barren, magnified.
„ 2. Do. common form, fruitful, magnified.

Vide Proceedings of Societies, page 66.

Robt. Smith del.

Forster & Co. lith. Dublin.

Fig 1

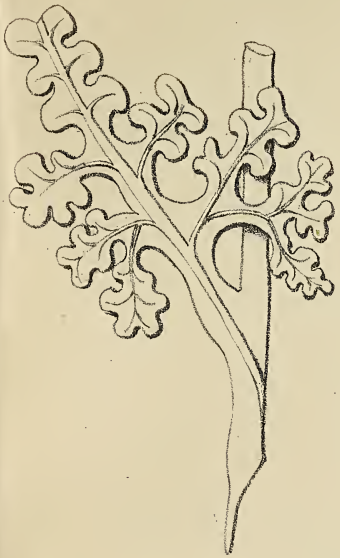


Fig 2.

Fig 3.

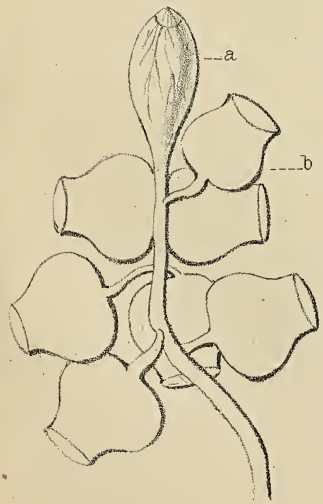
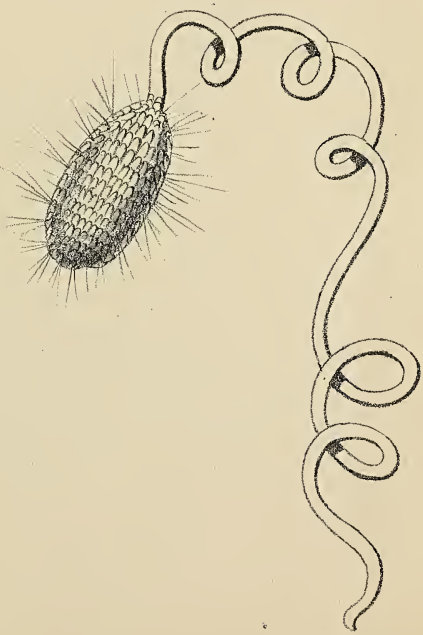


Fig 4.



E.P.W. ad. nat. del.

Forster & C.º lith. Dublin.

THE

NATURAL HISTORY REVIEW.

NOTICES

OF

Various Periodicals, and Transactions of Societies relating to Natural History,

FOR 1855-56.

VOL. III.

LONDON:
WILLIAMS AND NORGATE,
14, HENRIETTA-STREET, COVENT GARDEN.
EDINBURGH: WILLIAMS AND NORGATE.
DUBLIN: HODGES, SMITH, AND CO.
1856.

INDEX TO SERIALS.

PAGE.

Abhandlungen, Math.-phys. d. K. Bayerischen Akademie . . 17
,, Physikalische der K. Akademie zu Berlin . . 51
,, der Naturf. Gesellschaft in Halle . . 18, 68
,, der K. K. Geologischen Reichsanstalt . . . 54
,, Math.-Phys. d. K. Sachsischen Gesellschaft . . 67
Academy of Bavarian, Transactions of 17
,, Belgian, Memoirs, Prize Essays and Bulletin of the R. . 20
,, of Berlin, Transactions of 51
,, Dutch, Transactions and Proceedings of the Royal . . 19
,, of Bonn, Transactions of the Imperial . . 13, 50
,, Bruxelles. *See* Belgian Academy . . .
,, Dijon, Memoirs of 26
,, French, *See* Academy of Paris 21
,, of Naturalists of Bonn, Transactions of the Imperial . 13, 50
,, Paris, Memoirs and Prize Essays of . . . 21
,, Philadelphia, Proceedings of 3
,, Swedish, Transactions, Proceedings, and Reports of . . 7
,, of Turin, Memoirs of 26
,, Vienna, Memoirs and Proceedings of the Imperial . . 9, 37
Acta Nova Academiæ, C. L. C. Naturæ Curiosorum . . 13, 50
Allgemeine deutsche naturhistorische Zeitung . . . 33
Allman, G. J., Introductory Lecture to the Natural History Class in the University of Edinburgh 45
American Journal of Science and Arts 1, 49
Amsterdam. *See* Dutch Academy . . . .
Annales des Sciences Naturelles; Botanique . . 23, 69
,, ,, ,, Zoologie . . . 21, 69
,, de la Société Entomologique de France . . 24, 69
Annals and Magazine of Natural History . . . 27, 44, 57, 75
,, of the Entomological Society of France . . 24, 69
,, Imperial Geological Institute of Vienna . . . 11
,, Lyceum of Natural History of New York . . 3
,, of Mineralogy, Geology, and Paleontology . . . 14
,, of the Natural Sciences; Botany . . . 23, 69
,, ,, ,, Zoology . . . 21, 69
Annual. *See* Annals . . . . . .
Appendix to the Bulletin of the Belgian Academy . . . 21
Archiv fuer Anatomie und Physiologie 52
,, Naturgeschichte 15
,, Naturkunde Lief-, Esth- und Kurland . . . 50
,, des Vereins der Fr. d. Naturgeschichte in Mecklenburg . . 66
Archives du Museum d'Histoire Naturelle . . . 21, 57

PAGE.

Archives of Anatomy and Physiology 52
,, the Museum of Natural History of Paris . . 21, 57
,, Natural History; by Wiegmann, &c. . . . 15
,, ,, of the Dorpat Society . . . 50
,, Naturalists of Mecklenburg 67
,, Ornithology, for Germany 15
Association. *See* Bonn,—Dublin,—Dutch India,—Gottenburg,—Mecklenburg,—Saxony,—Society,—Stettin,—Vienna . . .
Bavarian Academy, Transactions of 17
Belgian Academy, Bulletin and Memoirs 20
,, Appendix to the Bulletin . . . 21
,, Prize Essays 68
Berichte der K. Sachischen Gesellschaft 16
Berlin Academy, Transactions of 51
Blood, Quantity of, in the Human Body 52
Bonn, Imperial Academy of Naturalists . . . 13, 50
,, Natural History Association of Prussian Rhineland, &c. . 12, 35
Boston (U. S.) Society of Natural History, Proceedings of . . 5
Botanical Journal. *See* Linnæa Botanica, by Schlechtendahl . . 18
,, *See* Phytologist . . . 64, 78
Brongniart and Decaisne. *See* Annals of the Natural Sciences; Botany.
Brussells, Academy of. *See* Belgian Academy . . . 20
Bulletin de l'Academie Belgique 20
,, de la Societé Entomologique de France . . 25, 70
,, de la Societé Geologique de France . . 25, 57
,, ,, des Naturalistes de Moskow . . . 6
,, ,, Vaudoise des Sciences Naturelles . . 55
Bulletin. *See* Proceedings.
Canadian Journal, new series 49
Cephalocotylea, Classification of 10
Chitons, Propagation of 28
Classification, Zoological, based on the generative organs . . 40
Crustacea, Orders of 16
Death, Test of Apparent and Actual 16
Denkschriften der Kaiserlichen Akademie . . . 9, 37
,, Neue, der Schweizerischen Gesellschaft . . . 55
Dijon Academy, Memoirs of 26
Dorpat Society of Naturalists 50
Dutch Academy 19
Dutch India, Journal of Natural Science for . . . 19, 56
Edinburgh New Philosophical Journal . . . 45, 58, 78
Entomological Journal of the Stettin Association . 17, 18, 35, 37
Entomological Society of France, Annals of . . 24, 69
,, ,, London, Transactions of . . . 60
Entomostraca, Classification of 15
France, Entomological Society of . . . 24, 69
,, Geological Society of 25, 57
French Academy 2

PAGE.
Geneva, National Institute of, Memoirs of the . . . 19
Genevese Society of Physics, &c., Memoirs of . . 19, 56
Geological Institute, Imperial, of Vienna, Annals of the . . 11, 54
,, ,, Transactions . . 54
Geological Society of France, Proceedings of . . 25, 57
,, ,, Memoirs of 26
Geological Society, German, Journal of . . . 16, 53
,, ,, of Dublin. *See* Index to their Journal, separately.
Giornale dell' I. R. Istituto Lombardo 26
Goetheborgs K. W. o. W. Samhalles Handlingar . . . 65
Gottenburg Society of Science, etc., Transactions of . . . 65
Grape disease, Origin of 51
Guérin-Méneville, Revue et Magazin de Zoologie . . . 39
Guitton, Zoological Classification based on generative organs . . 40
Haarlem, Scientific Society of, Transactions of the . . . 19
Halle, Natural History Society of, Transactions of the . . 18, 68
Haring, in Tyrol, Tertiary Flora of 54
Heart, or dorsal vessel, in Insects 38
Homology of members in the Articulata 15
Hooker's Journal of Botany . . . 30, 48, 64, 77
India, Dutch, Journal of Natural Science for . . 19, 56
Institute of France. *See* Academy.
,, Geneva, Memoirs of the National . . . 19
,, Geological, of Vienna 11, 54
,, Lombard, Journal of 26
,, Smithsonian. *See* Smithsonian Contributions.
Isis Society of Dresden, Journal of 33
Jahrbuch der K. K. Geologischen Reichsanstalt . . 11, 54
Journal of Botany, Hooker's 30, 48, 64, 77
,, Entomology. *See* Linnæa Entomologica . 18, 37
,, the Geological Society of Dublin. *See* Index separately.
,, ,, German Geological Society . . . 16, 53
,, ,, Linnean Society's Proceedings . . 48, 72
,, ,, Lombard Institute 26
,, Microscopical Science . . . 28, 45, 59, 79
,, Natural History in General, Isis Society of Dresden . . 33
,, ,, ,, Halle . . . 68
,, Natural Science for Dutch India . . . 19, 56
,, Scientific Zoology, by Siebold and Koelliker . 38, 51
Kew Garden Miscellany 30, 48, 64, 77
Kongliga Swenska Wetenskaps Akademiens Handlingar . . 7
,, ,, ,, Oefwersigt af Forhandlingar . . 7
,, ,, ,, Aarsberættelse . . . 8
Lille, Scientific Society of 26
Linnæa, Journal fuer die Botanik 18
,, Entomologica 18, 37
Linnean Society of London, Transactions of . . . 80
,, ,, Journal of Proceedings . . 48, 72

PAGE.

Liver, Saccharific function of the 22
Livonia, Archives of Natural History of 50
Lombard Institute, Journal of the 26
Malpighian vessels, number of, in Sisyra and Coniopteryx . . 66
Mauvaises terres of Nebraska 5
Mecklenburg, Archives of Association of Naturalists in . . 67
Memoires de l'Academie R. des Sciences de Belgique . . 20
,, de Dijon . . 26
,, de l'Institut de France . 21
,, Couronnés de l'Academie R. des Sciences de Belgique . . 68
,, Presentés a l'Academie de l'Institut de France . . 21
,, de l'Institut National Genevois . . 19
,, de la Société de Physique, &c. de Geneve . 19, 56
,, ,, Geologique de France . . . 26
,, ,, des Sciences de Lille. . . . 26
Memoirs. *See* Prize Essays,—Transactions. . . .
Memoirs of the Academy of Dijon . . . 26
,, Belgian Academy 20
,, French Academy 21
,, Genevese National Institute . . . 19
,, Geological Society of France . . . 26
,, Society of Physics, &c., of Geneva . . 19, 56
,, ,, Sciences of Lille . . . 26
,, Swiss Society of Science . . . 55
,, Turin Academy 26
,, Vienna Academy . . . 9, 37
Memorie della Reale Accademia delle Scienze di Torino . . 26
Menopon pallidum, Heart and circulation of . . . 38
Microscopical Society of London, Proceedings of . . 28, 45, 59, 78
Mineralogical Society of Russia, Transactions of . . 7
Mineralogy, Annals of 14
Milne-Edwards. *See* Annals of the Natural Sciences; Zoology.
Moscow Society of Naturalists, Bulletin of . . . 6
Mueller's Archives of Anatomy, Physiology, &c. . . . 52
Museum of Natural History of Paris, Archives of . . 21, 57
Mycophyceæ, Systematic place of the 13
Myriapoda, Embryogeny of the 23
National Institute of Geneva, Memoirs of . . . 19
Natural History Association of Prussian Rhineland and Westphalia 12, 35
" Society of Halle 18
" Journal of the Isis Society of Dresden 33
Naturalist, a Popular Monthly Magazine . . 32, 47, 65, 79
Natuurkundig Tijdschrift voor Nederlandsch Indie . . 19, 56
Naumannia, Organ of the German Ornithological Society . . 15
Nebraska, Fossils of the Mauvaises terres of . . . 5
Neue Denkschriften der Allgemeinen Schweizerischen Gesellschaft . 55
Neues Jahrbuch fuer Mineralogie, Geognosie u. s. w. . . 14
New Annals of Mineralogy, Geology, and Paleontology . . 14

PAGE.
New Memoirs of the Swiss Society of Science . . . 55
New York, Annals of the Lyceum of Natural History of . . 3
Newman's Memorandum on the wing-rays of Insects, Note on . . 61
Nova Acta Academiæ C. L. C. Naturæ Curiosorum . . 13, 50
Nouveaux Memoires de la Société Helvetique . . . 55
Oefwersigt af K. Swenska Akademiens Forhandlingar . . . 7
Oidium tuckeri, not a genuine species of fungus . . . 51
Ornithological Society, Journal of the German . . . 15
Philadelphia, Academy of, Proceedings of the 3
Philosophical Journal, Edinburgh New . . . 45, 58, 77
„ Transactions of the Royal Society . . 71
Physikalische Abhandlungen der K. Akademie zu Berlin . . 51
Phytologist, a Botanical Journal 64, 78
Pikermi in Greece, Fossil remains from 17
Praniza, viviparous 5
Proceedings of the Academy of Natural Sciences of Philadelphia . 3
„ „ Boston Society of Natural History . . . 5
„ „ Dutch Academy 19, 67
„ „ Linnean Society of London . . 48, 72
„ „ Royal Society 71
„ „ Saxon Society of Science . . . 16
„ „ Zoological Society of London . . . 73
Proceedings. *See* Bulletin. . . . .
Prussian Rhineland and Westphalia, Nat. Hist. Association of . 12, 35
Quarterly Journal of Microscopical Science . . . 28, 45, 59, 79
Radnitz in Bohemia, Tertiary Flora of 54
Reports on the Progress of Botany 8
„ „ „ Microscopical Anatomy 3
„ „ „ Zoology 8, 16
„ „ „ Zootomy 52
Revue et Magazin de Zoologie pure et appliquée . . . 39
Royal Society of London, Transactions and Proceedings of . . 71
St. Petersburg, Imperial Russian Mineralogical Society of . . 7
Saxon Society of Science 16, 67
Saxony and Thuringia, Natural History Association of . . . 68
Schlechtendahl's Botanical Journal, or Linnæa . . . 18
Siebenbuergen, Tertiary Flora of 54
Siebold and Koelliker's Journal of Scientific Zoology . . 38, 51
Silliman and Dana's American Journal of Science and Arts . . 1, 49
Sitzungsberichte der K. Akademie zu Wien 9, 37
Smithsonian Contributions to Knowledge 5, 49
Societies. *See* Boston—Canadian—Dorpat—Dublin—Dutch India—Entomological—Genevese—Geological—Gottenburg—Guérin Méneville—Haarlem—Halle—Isis—Liége—Lille—Linnean--Mecklenburg--Microscopical--Mineralogical—Moscow—New York—Ornithological—Prussian—Royal—Saxon—Saxony and Thuringia—Stettin—Swiss—Vaudois—Zoological.

PAGE

Stettin, Entomological Association of, Journal of the . . 17, 35
" " Linnæa Entomologica . 18, 37
Stomata of Plants, Nature and Function of the . . . 50
Sugar, production of, a Function of the Liver . . . 22
Sumatra, Excursion in, by James Motley 30
Swedish Academy, Transactions, Proceedings, and Reports of . . 7
Swiss Society of the Natural Sciences, New Memoirs of . . 55
Talus, new term in Insect Anatomy 18
Thallophysis, new name for the Stomata of Plants . . . 50
Transactions of the Academy of Naturalists of Bonn . . 13, 50
" Bavarian Academy 17
" Berlin Academy 51
" Dutch Academy 19
" Entomological Society of London . . . 60
" Haarlem Society 19
" Linnean Society of London . . . 80
" Nat. Hist. Association of Prussian Rhineland 12, 35
" Natural History Society of Halle . . 18, 68
" Saxon Society of Science . . 16, 67
" Vienna Academy 9, 37
" Zoological and Botanical Association of Vienna 12, 65
Turin Academy, Memoirs of 26
Vaudois Society of Science, Bulletin of 55
Verhandelingen der K. Akademie van Wetenschappen . . 19
" Natuurkundige, van de Hollandsche Maatschappij . 19
Verhandlungen der Russisch K. Mineralogischen Gesellschaft . . 7
" des Nat. Hist. Vereines der Preuss. Rheinlande . 12, 35
" des Zoologisch-botanischen Vereins zu Wien . 12, 65
Victoria, Vegetation of the Colony of 31
Vienna Academy, Memoirs and Proceedings of . . . 9, 37
Vienna Zoological and Botanical Association, Transactions of . 12, 65
Wiegmann's Archives of Natural History; continued by Troschel . 15
Zeitschrift der deutschen Geologischen Gesellschaft . . 16, 53
" fuer die Gesammten Naturwissenschaften . . . 68
" fuer wissenschaftliche Zoologie . . 38, 51
" neue, fuer Mineralogie, Geognosie, Geologie, U. S. W. . 14
Zoological and Botanical Association of Vienna . . 12, 65
Zoological Society of London, Proceedings of . . . 73
Zoologist 29, 46, 59, 76
Zygæna, species and varieties of 66

Notices of Serial Publications.

We have been induced, at the request of several of our readers, to extend these notices to the chief periodicals published on the Continent. As it happens that more than one of these have commenced a new series with the year 1854, or contemporaneously with this Review, we have taken that for the starting point in most cases. Having, therefore, to work up back numbers, we make the notices short, often abridging the headings of articles, or merely indicating their subject matter. In the case of volumes professedly devoted to Natural History or Geology, we have seldom ventured to exclude an article on account of its matter being rather out of those limits. Other notices, from the serials of a mixed cast, may seem also to trench upon the grounds of rural economy, chemistry, pathology, &c., as we have sometimes found it hard to draw the line. For the contents of some, which have not reached us, we have to own ourselves indebted to the useful half-yearly catalogue, Bibliotheca Historico-naturalis, Physico-chemica et Mathematica, of which Williams and Norgate are the London publishers. And for material assistance derived from the Dublin University Library, we have to thank the officers, and, in particular, the Senior Librarian, the Rev. J. H. Todd, D.D., S.F.T.C.D.

AMERICA.

The American Journal of Science and Arts; conducted by Professors Silliman and Dana. Second Series. 8vo. New York. Vol. XVII. January to May, 1854.

Zoology.—(Agassiz) The Primitive Diversity and Number of Animals in Geological times—p. 309-324. This interesting paper has been so largely quoted that it is needless for us to notice it more particularly here. (Same) Fishes from the Southern bend of the Tenessee River, Alabama—p. 297-308, 353-365. Many new species; *Hybopsis*, n. g. of Cyprinidæ. (Same) Additional Notes on the Holconoti—p. 365-369. (Burnett) Reviews and Records in Anatomy and Physiology—p. 89-102. (Same) On the Renal Organs in the four classes of Vertebrata—p. 375-386. (Same) Development of Viviparous Aphides—p. 62-78. Additional Note, on do.—p. 261, 262. (Wyman) On the Eye and Ear of the Blind Fishes of the Mammoth Cave, *Amblyopsis spelaeus*—p. 259-261. (Same) On the Development of the Surinam Toad, *Pipa Americana*—p. 369-374. Contains observations of great interest on the production of organs in analogous genetical order, without apparent functional purpose. Botany.—(Engelmann) On the Cereus giganteus of S. E. California, and an allied species from Sonora —p. 231-235. Review.—Hooker's Flora of New Zealand, Introductory Essay—p. 241-252, 335-350. Geology, Paleontology, etc.—(Bailey) New Localities of Fossil Diatomaceæ in California and Oregon—p. 179, 180. (Dana) Mineralogical Contributions—p. 78-88. (Same) Contribution to Chemical Mineralogy —p. 210-221. (Delesse) On Globuliferous Rocks—p. 168-176. (Foster and Whitney) Extracts from the Report on the Geology of the Lake Superior Land District—p. 11-33. (Genth) A New Meteorite from New Mexico—p. 239, 240. (Greg) Conistonite, a new mineral species—p. 333, 334. (Hall) Silurian System of the Lake Superior Region—p. 181-194. (Hunt) On Algerite—p. 351, 352. (Logan and Hunt) Chemical Composition of Recent and Fossil *Lingulæ*, &c.—p. 235-339. (Shepard) New Localities of Meteoric iron—p. 325-330.

(Whitney) On Algerite and Apatite—p. 206-210. (Willet) Meteoric Iron from Putnam, Co. Georgia—p. 331, 332. Review.—Marcon's Geological Map of the United States and the British Provinces of North America—p. 199-206. Miscellaneous.—(Cotta) Eulogy on Von Buch, translated from the German—p. 1-11. (Rose) Biography of Berzelius concluded—p. 103-113. Correspondence. —p. 113-120, 262-271, 407-420. (Burnett) Physical Features of Florida—p. 407-412. Intelligence.—p. 121-152, 271-296, 421-456. (Gray) On the age of the large tree lately felled in California—p. 440-443.

Vol. XVIII. June to November, 1854. Zoology.—(Burnett) Reviews and Records in Anatomy and Physiology—p. 104-114. (Dana) On the Geographical Distribution of Crustacea—p. 316-326; an extract from the author's Report on Crustacea—a volume which we purpose noticing more fully elsewhere. Botany.—(Dewey) Caricography—p. 102-104. (Gray) Note on the genus *Buckleya*—p. 98-100. Geology, Paleontology, Etc.—(Brant) On Fuchs's Method for the Determination of Iron—p. 227-229. (Brush) Chemical Composition of Clintonite—p. 407-409. (Coan) Present condition of the Crater of Kilauea, Hawaii—p. 96-98. (Connell) On Columbite and Tantalite; extract from Phil. Mag.—p. 392-394. (Same) Homœomorphism of Mineral species of the Trimetric System—p. 35-54. (Dana) Mineralogical Contributions—p. 249-254. (Genth) Contributions to Mineralogy—p. 410, 411. (Hayes) On Borocalcite from Iquique, S. Peru—p. 95. (Hunt) On some Crystallized Limestones of North America—p 193-200. (Mallet) On the Phosphate of Iron and Manganese, from Norwich, Massachusets—p. 33, 34. (Shepard) On Meteoric iron from Sonora—p. 362-372. (Laurence Smith) Re-examination of American Minerals—p. 372-381. (Tylor) On Changes of the Sea Level, produced by existing Physical Causes, during stated periods of time—p. 216-227. Review of Murchison's Siluria—p. 394-406. Miscellaneous.—(Baily) Mode of giving permanent flexibility to brittle specimens in Botany and Zoology—p. 100-102. (Forbes) On the Educational Uses of Museums; Extract—p. 340-352. (Wyman) Biographical Notice of Dr. Waldo Burnett—p. 255-264. Correspondence—p. 114-124, 381-392, 431-439. Intelligence—p. 124-157, 265-304, 412-451. American Association of Science—p. 143-146. (Gray) Botany of the United States Exploring Expedition, under Captain Wilkes. Phanerogamia, Vol. I. Exogenæ Polypetalæ—p. 132. Mammoth trees of California—p. 286. Allen's Victoria Regia, with 6 plates, folio, Boston, 1854—p. 428. *Crytopodia occidentalis*, Dana, n. sp.—p. 430.

Volume XIX. January to May, 1854. Zoology.—(Agassiz) Synopsis of the Ichthyological Fauna of the Pacific Slope of North America; chiefly from the collections made by the United States Exploring Expedition, under the command of Captain Wilkes, with recent additions and comparisons with Eastern types.—p. 71-99, 215-231. (Bacon) On Oil contained in the Crustaceans found in the Cochituate water—p. 261-263. (Dana) On the Geographical Distribution of Crustacea—p. 6-15. (Valenciennes and Fremy) On the Composition of Eggs in the Series of Animals—p. 38-48, 238-243. Botany.—(Braun) The Vegetable Individual in relation to Species—p. 297-318. Translation from Trans. Berlin Acad., 1853. (Dewey) Caricography—p. 252-256. (Neister) On the Fructification of *Arachis hypogœa* —p. 212, 213. (Dana) Supplement to his Mineralogy—p. 353-371. (Genth) Contributions to Mineralogy—p. 15-23. (Hitchcock) Impressions, chiefly tracks on Alluvial Clay in Hadley, Massachusets—p. 391-396. (Le Conte) Account of some Volcanic Springs in the Desert of Colorado, in Southern California—p. 1-6. (Schoolcraft) Discovery of a Coal basin on the Western borders of the Lake of the Woods—p. 232-234. (Warren) Supernumerary Tooth in *Mastodon Giganteus*—p. 349-353. Review.—Emmons on American Geology—p. 397. Review of Murchison's Siluria—p. 371-385. (Morfit) On Gum Mezquite—p. 263, 264. Correspondence.—p. 103-109, 407-417. Intelligence.—110-152, 264-296, 418-454.

Vol. XX., Part 1, July, 1855. (Hitchcock) Description of a new Clathropteris, discovered in the Connecticut Valley Sandstone—p. 22-25. (Whitney) On the Change in the Structure and Composition of Mineral Veins near the surface, with particular reference to the East Tennessee Copper Mines—p. 53-57. (Blake)

Observations on the extent of the Gold Region of California and Oregon, etc. —p. 72-85. (Mallet) Analysis of Idocrase from Ducktown, Tennessee—p. 85. Correspondence—p. 102-112. Intelligence—p. 113-152.—Part 2. Sept., 1855. (Manross) On the Pitch Lake of Trinidad—p. 153-160. (Dana) Geographical Distribution of Crustacea (continued from Vol. 19, p. 15)—p. 168-178. (Blake) On the Grooving and polishing of hard Rocks and Minerals by dry sand—p. 178-181. (Braun) The Vegetable Individual, etc. Part 2 (continued from vol. 19, p. 318)—p. 181-201. (Bentham) Additional Note on *Arachis Hypogaea*—p. 202-203. (Lawrence Smith) Re-examination of American Minerals—p. 242-253. Correspondence—258-266. Intelligence—p. 204-304. American Association for the Advancement of Science; Meeting for 1855—p. 289-292. (Gibbs) Note on the Coal Beds of Bellingham Bay, California—p. 298-299.

Annals of the Lyceum of Natural History of New York. 8vo. New York. Vol. VI. No. 1-4. 1853, 1854.

(Anthony) New Fluviatile shells of the g. *Melania* from Western North America—p. 80-130. (Bland) On the geographical distribution of the terrestrial Mollusks that inhabit the Island of St. Thomas, W. I.—p. 74, 75. (Same) On the absorption of internal parts of their shells by the animals of Stoastoma, Lucidella, Trochatella, Helicina, and Proserpina—p. 75-77. (Same) On *Proserpina opalina* Adams, and *Helix proserpinula* Pfr.—p. 77, 78. (Breevoort) Note to the description of *Selene argentea* (antea vol. 5, p. 68)—p. 30-35. (Dana) On the Homœomrphism of mineral species of the trimetric system—p. 37-64. (Fairbank) On the animal of Rotella—p. 35, 36. (Laurence) New species of *Ortyx*, *Sterna*, and *Icteria*—p. 1-4. (Same) Additions to N. American Ornithology, No. 3.—p. 4-7. (Same) Ornithological notes, No. 2.—p. 7-14. (Same) Description of a new species of Larus—p. 79, 80. (Newcomb) New species of Achatinella from Sandwich Islands—p. 18-30. (Prime) Description of three new species of Pisidium—64-66. (Same) On the identity of *Cyclas elegans* Adams with *C. rhomboidea Say*—p. 66, 67. (Redfield) New species of Helicidæ—p. 14-18. (Same) New species of shells—p. 130-132. (Shuttleworth) Catalogue of the terrestrial and fluviatile shells of St. Thomas, W I.—p. 68-73.

Proceedings of the Academy of the Natural Sciences of Philadelphia. Vol. VII. No. 1-8. Philadelphia, 1854, 1855.

(Baird) Description of new Genera and Species of N. American Frogs—p. 59-62. New species 17; new genera, Chorophilus, Helocætes. (Same) New species of Birds (8) collected between Albuquerque, New Mexico, and San Francisco, California, by Dr. Kennerly and H. B. Mœllhausen—p. 118-120. (Same) Characters of some new species of N. American Mammalia—p. 331-340. (Baird and Girard) New species of Fishes (19) collected in Texas, New Mexico, and Sonora—p. 24-29. (Same) Cochlognathus, a new genus of Cyprinidæ—p. 158. (Bernsee) Note on some animals of the Falkland Islands—p. 287-290. (Blake) On tertiary strata of Infusoria and Polythalamia, near Monterey, California—p. 328-331. (Brinton) New mode of preparation of anatomical specimens—p. 71, 72. (Cassin) *Loxia leucoptera* abundant near Philadelphia—p. 203. (Same) List of Pigeons of the g. *Carpophaga*, in the Academy of N. Sc., Philadelphia, and from the U. S. Exploring Expedition—p. 227-232. (Same) On N. American Falconidæ, with descriptions of (3) new species—p. 277-284. (Conrad) Rectification of the generic names of Tertiary fossil shells—p. 29-32. (Same) Notes on shells, description of three recent and one fossil species—p. 31, 32. (Same) Three new species of Unio—p. 256. (Same) On the Eocene deposit of Jackson, Mississippi, with descriptions of 34 new species of shells and corals—p. 257-263. New genera, Papillina, Osteodes. (Same) Descriptions of eighteen new cretaceous and tertiary fossils; of one tertiary and eight new cretaceous fossils from Texas; of a new Melania—p. 265-268, 269. (Da Costa) New process for minute injections—p. 90, 91. Sandarach, or Damarra copal, dissolved in ether, filtered and coloured. (Couch) Descriptions of new birds of Northern Mexico—p. 66, 67. (Dana) Catalogue and Descriptions of Crustacea collected in California by Dr. J. L. Leconte—p. 175-177. New genera of Isopoda, *Alloniscus*, *Aegacylla*. (Dawson) On fossil conife-

rous wood from Prince Edward's Island—p. 62-64. (Dudley) Description of a species of Crane found in Wisconsin, *Grus hoyianus*, n. sp.—p. 64. (Evans and Shumard) New fossil species from the cretaceous formation of Sage Creek; also from the fresh water formation of Nebraska—p. 163, 164, 165. (Foulke) Criticism of Hugh Miller's Lecture, the Two Records, etc.—p. 69, 70. (Genth) Herrerite identical with Smithsonite—p. 232-236. (Same) Analysis of meteoric iron of Tuczon—p. 317. (Gibbons) Four new species of viviparous fishes from Sacramento river, and bay of San Francisco—p. 105, 106. (Same) Twelve new species of viviparous marine and fresh water fishes from California—p. 122-126. (Gilman) Habits of the Moose—p. 342-346. (Girard) *Limnadella*, n. g. of Entomostraca—p. 3, 4. (Same) *Salmo gloverii*, n. sp., from the N.E. of U. S.—p. 85, 86. (Same) List of N. American Bufonidæ, with diagnoses of new species—p. 86-89. (Leidy) *Harlanus* of Owen referable to Bison latifrons—p. 89, 90. (Same) On fossils from S. Carolina and Nebraska—p. 90, 91. (Same) New fishes collected by Dr. Heermann, Naturalist to the Pacific Railroad Survey—p. 129-140. New species, 30; new genera, Aspicottus, Leptocottus, Scorpaenichthys, Ophiodon, Atherinopsis, Pogonichthys, Lavinia, Platichthys, Pleuronichthys, Parophrys, Psettichthys. (Same) Marine fishes from San Francisco—p. 141, 142. New g. Porichthys. (Same) Fishes from the Pacific coast, collected by Lieut. Trowbridge—p. 142-156. New genera, Heterostichus, Apodichthys, Phanerodon. (Same) Characters of some Cartilaginous fishes of the Pacific coast of N. America—p. 196, 197. (Same) Abstract of a Report on the fishes collected during the U. S. Nautical Astronomical Expedition to Chili—p. 197-199. New genera, Percichthys, Percilia, Basilichthys, Heterognathus, Nematogenys, Cheirodon. (Same) Abstract of a Report on the Reptiles, etc.—p. 226, 227. (Same) On the viviparous fishes of the Pacific coast—p. 318-328. (Hallowell) Descriptions of new reptiles from California—p. 91-97. New genera, Dipsosaurus, Urosaurus. (Same) *Microphis quinquelineatus*, a new serpent from Honduras—p. 97. (Same) On the geographical distribution of Reptiles; with descriptions of new species—p. 98-105. *Brachycranion*, new genus of Viperidæ from Western Africa. (Same) Descriptions of new Reptiles from Guinea—p. 192-194. (Heermann) Additions to the Ornithology of N. America—p. 177-180. (Henry) Notes on the birds of New Mexico—p. 306-317. (Jones) Abstract of experiments on the physical influences exerted by living organic and inorganic membranes on chemical substances passing through them by Endosmosis—p. 204-209. (King) On the ancient alluvium of the Ohio river and its tributaries—p. 4-8. (Same) Fossil trees in the coal rocks near Greensburg, and fossil fruit in those of Beaver Co., Pennsylvania—p. 64, 65. (Lea) Rectification of Conrad's Synopsis of the family of Najades of N. America (in Proc. for February, 1853)—p. 236-249. (Same) Description of a new Mollusk, *Cyprinocardia leidyi*, from the Red Sandstone near Pottsville, Pennsylvania; with a plate—p. 340-342. (Leconte) Notice of American animals formerly known, but now forgotten or lost—p. 16-20. (Same) Descriptions of some new Coleoptera from Oregon—p. 20. (Same) Synopsis of the Œdemeridæ of the U. S.—p. 21. (Same) Note on the g. *Amblychila* Say; with a plate—p. 32, 33. (Same) Synopsis of the species of *Platynus*, and allied genera, of U. S.—p. 35-59. Leconte, following Brullé, has adopted Platynus for the united group, to which Erichson afterwards applied the name Anchomenus. One new genus *Anchus* is characterised. (Same) Synopsis of the Cucujides of the U. S.—p. 73-79. (Same) Notice of some Coleopterous Insects from the collections of Mexican Boundary Commission—p. 79-85. *Ulochætes*, n. g of Longicornia, from Oregon. (Same) Synopsis of the Dermestidæ of the U. S.—p. 106-113. *Apectus*, n. g. resembling Trinodes, but the mesosternum is entire and the tibiæ not dilated. (Same) Synopsis of the Byrrhidæ of the U. S.—p. 113-117. The genus *Physemus* Motsch. is characterized; the species *Ph. minutus* from the banks of the Colorado river, Columbia. (Same) Synopsis of the Erotylidæ of the U. S.—p. 158-163. Leconte still unites Tritoma with the genus Triplax. Of this genus 18 species, and 13 of Languria, compose the greater part of the family. The rest is Engis 1, Dacne 2, Ischyrus 1, Erotylus 2, from California and New

Mexico. (Same) Description of four new species of Kinosternum—p. 180-190. (Same) Observations on *Vespertilio leporinus* of Linnæus—p. 190-191. (Same) Descriptions of the Species of Trox (14) and Omorgus (11); inhabiting the United States—p. 211-216 (Same) Some corrections in the Nomenclature of Coleoptera inhabiting the United States—p. 216-220. (Same) Descriptions of new Coleoptera, (28 spp.) collected by Dr. T. H. Webb, in the years 1850-1852, while Secretary to the United States Mexican Boundary Commission—p. 220-225. (Same) Synopsis of the Pyrochroides of the United States—p. 270-277. Nematoplus, n. g. (Same) Analytical table of the species of *Hydroporus* found in the United States; with descriptions of new species—p. 290-299. (Same) Synopsis of the Lathridiidæ of United States, and Northern contiguous territories—p. 299-306. (Same) The Amaræ of the United States—p. 346-356. (Same) Synopsis of the Hydrophilidæ of the United States—p. 356. (Leidy) Bones of Saurians (*Brimosaurus grandis*, *Cimoliasaurus magnus*) from near Greenville, Arkansas; with a plate—p. 72. (Same) Remarks on a Review of his work, "A Flora and Fauna within living Animals," in the *Gardeners' Chronicle*—p. 128,129. (Same) Synopsis of Extinct Mammalia from the Eocene formations of Nebraska—p. 156-157. (Same) Description of a fossil, apparently indicating an extinct species of the Camel Tribe—p. 172-175. (Same) On *Urnatella gracilis*, and a new species of *Plumatella*—p. 191, 192. (Same) Fossil Bones from the banks of the Ohio, Indiana—p. 199-201. (Same) On the question as to the identity of *Böotherium cavifrons* with *Ovibos moschatus*—p. 209-211. (Stimpson) Descriptions of some of the new Marine Invertebrata, from the Chinese and Japanese seas—p. 375. (Tuomey) Description of some new Fossils, from the cretaceous rocks of the Southern States—p. 167-172. (Wetherill) Occurrence of Gold near Reading, Pennsylvania—p. 233, 234

Smithsonian Contributions to Knowledge. 4to. Washington. Vol. VI. 1854.

(Stimpson) Marine Invertebrata of Grand Manan (Bay of Fundy), with 3 plates—pp. 68, contains characters of several new genera, viz.:—(*Acalephæ*) Grammaria, Acaulis; (*Dendrocœla*) Nareda; (*Tubicolæ*) Lumara; (*Maricolæ*) Tecturella, Brada, Enonella, Cryptonota; (*Isopoda*) Asellodes; (*Amphipoda*) Leptothoë, Monoculodes, Ptilochirus, Pseudophthalmus. The author has observed the ventricose body of *Praniza cernia f.* filled with eggs, but has not remarked the fact, which we have verified in respect to the allied *P. cæruleata* of the British shores, that it is viviparous, and the young not very dissimilar to the parent. (Torry) Description of plants collected in California by Col. Fremont, with 10 plates—pp. 24. The new genera characterized are—Spraguea (*Portulaceæ*); Fremontia (*Bombaceæ*), composing, with *Cheirostemon*, a peculiar section of the order; Coleogyne (*Rosaceæ*) intermediate between Chrysobalaneæ and Dryadeæ; Emplectocladus (Dryadeæ?); Carpenteria (*Philadelpheæ*); Sarcodes (*Monotropeæ*), which order, as he shows, is not separated by any important character from the Pyroleæ. (Same) Observations on *Batis maritima*, &c., with a plate—pp. 8. (Same) On *Darlingtonia californica*, a new pitcher plant from California, with a plate—pp. 8. (Leidy) Remains of extinct Mammalia and Chelonians, from the Mauvaises terres of Nebraska, with 25 plates—pp. 124. An important contribution to Paleontology. The singular valley of subsidence, called Mauvaises terres, is about 19 English miles by 12 in extent, and from 100 to 300 feet below the plateau surrounding. The remains of animals occur in a stratum resting immediately upon the green sand, and belong to the Eocene period, probably coëval with the fossils of the Paris basin; but are completely petrified, and bear no marks of having been rolled or water worn. The Mammalian remains are all of the order Ungulata, with the single exception of a *Machærodus;* but none of them identical with those of the Montmartre gypsum. The Chelonians, 5 species, belong to g. Testudo.

Proceedings of the Boston Society of Natural History. 8vo. Boston, U. S. Vol. V. 1854-1855.

(Ayres) On a preservative against the ravages of Teredo—p. 75-76. Asphalt 100, sulphur 40, arsenic 20 parts, applied hot as a paint to the dry wood. (Same)

New species of Californian fishes—p. 94-103. (Same) On American Hydræ—p. 103-104. (Bacon) On Cochituate water—p. 144, 145, 163, 164, 169-175. (Barry) On the Ornithological Fauna of Wisconsin—p. 1-14. (Bigelow) On the height (supposed 500 feet) of one of the giant trees of California—p. 75. (Burnett) On the poison apparatus of the rattlesnake—p. 31-34. (Same) On the orange insect—p. 108-110. (Cabot) Notes on the wild hybrid duck—p. 118-120. (Same) On the distribution of the species of Tetrao in the New England States—p. 154. (Girard) New species of fishes from Massachusets—p. 40-42. (Same) Remarks on the Embiotocidæ—p. 81, 82. (Same) On *Arenicola natalis*—p. 88, 90. (Gould) On the Society's collection of Argonauts—p. 35, 36. (Same) Brief notes of some deep dredgings off the coast of Georgia and Florida, by the Coast Survey—p. 126, 127. (Same) New species (8) of land and freshwater shells from Western North America—p. 127-130. (Greenleaf) On the flight of the American passenger-pigeon at Madison, Indiana—p. 180-182. (Hayes) On the saline incrustations of the Mauvaises terres of Nebraska—p. 150-153. (Same) Fossilized eggs from the Guano Islands of Peru—p. 165, 166. (Jackson) On a new mine of gold, silver, and copper, in Vermont—p. 62. (Same) Note on the chemical composition of the scales of the Gar pike—p. 92-94. (Same) Analysis of Allophane from Tennessee—p. 120. (Same) On the Cochituate water—p. 161-163, 175, 176. (Same) Allanite at Manchester, New Hampshire—p. 189. (Kineland) On the Wellingtonia gigantea—p. 49-51. (Same) On skulls of American Indians—p. 76-78. (Lapham) On the number of teeth in *Mastodon giganteus*—p. 133-136. (Lewis) *Cyclas crocea* n. sp.—p. 25, 26. (Same) On the variation of *Lymnea catascopium*—p. 27-29. (Same) On *Paludina decisa* Say—p. 52, 53. (Same) On the effects, of locality, temperature, &c., on the form of shells—p. 120-122. (Same) Remarks on the *Cyclas* and *Lymnea*—p. 120-124. (Richardson) On some points in the osteology of the Mastodon and fossil elephant—p. 82-84, 107. (Rogers) On fossils from the middle secondary beds of North Carolina, Virginia, Pennsylvania, and Massachusets—p. 14-18. (Same) On the epoch of the Mammoth—p. 22, 23. (Same) On natural coke of Richmond, Virginia, and the influence of the trap beds—p. 53-56. (Same) On impressions, footprints, &c., in the red shale, under the coalmeasures of Pennsylvania—p. 182-188. (Same) On fossil raindrops—p. 188, 189. (Same) On Lignite of Virginia and new red sandstone of North Carolina—p. 189-201. (Same) On a new locality for "Posidonomya" of the mesozoic rocks of Virginia, and on the effect of Trappean rocks on the same beds—p. 201. (Sprague) On Ranunculus micranthus—p. 155-156. (Stimpson) On some marine Invertebrata inhabiting the shores of South Carolina. *Ancystropus* n. g. of fam. Gephyrea, and several new species, fully described—p. 110-118. (Storer) *Sebastes fasciatus* n. sp.—p. 31. (Warren, &c.) On the number of the teeth of *Mastodon giganteus*—p. 147-150, 188-160. (Wyman) Notes on *Pipa Americana*—p. 13, 14. (Same) On *Amblyopsis spelaeus*—p. 18, 19. (Same) On the electrical laminæ in Torpedo occidentalis—p. 21-22. (Same) On the heart and respiration of Menobranchus and the Batrachians—p. 51. (Same) Notice of the life and writings of Dr. Waldo Burnett—p. 64-74. (Same) On the development of *Anableps gronovii*, a viviparous fish from Surinam—p. 80, 81. (Same) Remarks on Batrachian footsteps—p. 74-88. (Same) On parasitic cryptogamous plants, destructive to the house fly—p. 90-92. (Same) On the manner in which birds retain their position in roosting—p. 125, 126. (Same) Notes on hybernating insects—p. 157.

RUSSIA.

Bulletin de la Societe Imp. des Naturalistes de Moscow.—Bulletin of the Moscow Society of Naturalists. Vol. 27, No. 1, 2. 8vo. Moscow, 1854.

Zoology.—(Chaudoir) On the family Carabici, 4th part, p. 112-144, 279-352. (Czernay) List of the Lepidoptera of the Governments of Charkow and Poltawa, p. 212-225. Too incomplete to draw any conclusion from; only 110 of the Nocturna being enumerated, while there are 1,128 species of the same recorded for the Volga-Ural district. (Fischer) On some new species of Daphnidæ and Lynceidæ;

with a plate—p. 423-434. (Golawatskow) *Larus columbinus*, n. sp., from the shores of the Caspian; with a plate, p. 435-441. (Maslowsky) Defence of the specific claims of *Aspius owsianka* Czernay, p. 442-452. Botany.—(Hermann) Analysis of Salsola soda, p. 261-266. (Semenow) On the Moscow water lilies. p. 226-232. Only *Nymphæa biradiata* Somm. occurs. (Stschégleew) New Supplement to the Flora of Alatau and Songaria, p. 145-211. (Taratschkoff) On the vegetation of native plants about Orel, &c., p. 470-480. (Turczaninow) Descriptions of the plants growing wild about Lake Baikal, and in Dahuria (continued), p. 353-422. Geology.—(Büttner) Geognostic-geological views, derived from the stratification of Courland, p. 233-260. The author is disposed to attribute the disturbances of the earth's crust to successive approaches of the moon, revolving as a comet; the latest approach, when she was drawn within the predominating influence of the earth's attraction, and became a satellite, having transferred the earth's former poles to the equator, and occasioned the migrations of the nations, by which he supposes the earth to have been already peopled when this took place!! (Eichwald) The Grauwacke formations of Livonia and Esthonia; with 2 plates, p. 3-111. (Herman) Analysis of semicalcareous Diallag, a new mineral from the Achmatowsk quarries, p. 273-274. (Platner) Discovery of a coal bed on the western slope of the Ural, p. 267-272. Miscellaneous.—(Becker) Brief account of his observations in 1853, p. 453-469. (Spassky) Meteorological Observations at Moscow, January to August, p. 489-506. Correspondence, p. 481-488. Proceedings, p. 507.

Verhandlungen der Russisch-Kaiserlichen Mineralogischen Gesellschaft zu St. Petersburg. Transactions of the I. Russian Mineralogical Society. 8vo. St. Petersburg. 1854.

(Grewingk) The Emerald Mines of the Ural, and the environs; with a map —p. 206-233. (Von Kokscharow) Materials for the Mineralogy of Russia; with 9 plates—p. 1-66, 127-205. (Kutorga) On some species of *Sphaerexochus* and *Cheirurus*. from the Silurian limestone beds of the Government of St. Petersburg; with 3 plates—p. 105-126. (Same) Report on the Progress of Mineralogy, Geognosy, Paleontology, and Mineralogical Chemistry in Russia, for the year 1853—p. 240-249. (Mendelejew) Chemical analysis of Orthite from Finland—p. 234-239. (Noeschel) The Goktscha Lake in the Caucasus, geognostically, hydrographically, and meteorologically considered; with a map and 5 plates—p. 67-104. Alphabetical index to the preceding volumes of the Society's Transactions—p. 253-284.

SWEDEN.

Royal Academy of Sciences, &c.

Kongl. Swenska Akademiens Handlingar, foer Aar 1852.—Transactions for the Year 1852. 8vo. Stockholm, 1854.

(Zeller) The Microlepidoptera collected in Caffraria by Wahlberg—p. 1-120. Species described 110; all new but 12. New genera; (*Pyralides*) Crocidolomia, Hymenoptychis, Ulopeza, Zinckenia, Pogonotropha; (*Tortrices*) Eccopsis; (*Tineæ*) Compsoctena, Setomorpha, Ceromitia, Eretmocera, Cryptolechia. (Wallman) Essay towards a systematic arrangement of the family Characeæ—p. 229-331.

Transactions for the Year 1853. 8vo. Stockholm, 1855.

(Anderson) On the Botany of the Galapago Islands. Introduction, p. 61-120. List of plants, with remarks; and descriptions of the new species, p. 121-256.

Oefwersigt af K. Sw. A. Forhandlingar foer Aar 1853.—Proceedings for the Year 1853. 8vo. Stockholm, 1854.

Zoology.—(Hammargren) Birds of Wermland and Dalsland, shores of Lake Wener, p. 121, 122. (Nilsson) Sciaena aquila taken off the Swedish coast, p. 70. (Stæl) New Swedish Homoptera, p. 174-177. (Same) New Hemiptera from Caffraria, collected by Wahlberg, p. 209-227; 94 species. New genera (*Geocorisæ*) Elasmogaster, Petalocnemis, Neurodederrhis, Atractophora, Dermatinus,

Sphinctothorax. Phonergates, Clopophora, Glymmatophora, Cleptria, Pantolestes, Harpagocoris, Phonoctonus, Sphagiastes, Laphyctes, Tribelocephala, Lopodytes, Tenagogonus; (*Hydrocorisæ*) Ilyotrephes; (*Homoptera*) Hypselometopum, Simotettix, Strongylodemas, Embolophora, Rhinotettix, Hapalomelus, Amblycotis, Tropidocephala, Acrometopum, Cystingocephala, Petalocephala, Euryprosopum. (Sundewall) Branchiostoma caribæum, n. sp., p. 11-13. (Same) Occurrence of Perdix coturnix, Anas falcaria, Acipenser huso, in Sweden, p. 227, 228. (Thompson) The Palpicornia of Sweden, p. 40-58. New species, Helophorus pallidipennis, H. æneipennis (*aquaticus Er.*), H. laticollis (*granularis* Zett. Ins. Lapp.) H. nivalis (*griseus* var B. Zett. Ins. Lapp.); Limnebius truncatulus; Laccobius nigriceps; Philydrus maritimus; Cercyon palustre, *C. dorsostriatum* (is C. depressum Steph.). (Wallengren) Ardea purpurea shot in Scania, p. 123. (Same) The Hesperoideæ of Scandinavia, p. 19-26. Eleven species, viz, Thanaos, 1; Heteropterus, 1; Hesperia, 4; Syrichthus, 5; one new S. andromedæ, allied to S. malvæ. (Same) Addenda to the Birds of N. W. Scania, p. 124, 125. (Same) Lepidoptera, new to Sweden, p. 169-174. Botany.—(Areschoug) Virginia, n. g. of Algæ, from California; with a plate, p. 145-147. (Same) Spongocladia, n. g. of Algæ, from Mauritius; with a plate, p. 201-209. (Same) On conjugation in Zygnemaceæ, p. 251-258. (Fristedt) Botany of Tornea bog, &c., p. 5—11. (Wallman) Synopsis of the Characeæ, p. 26-30. Miscellaneous.—(Anderson) Letters (botanical) from Sydney and the Cape, p. 58, 75, 177. (Rosenschold) Letter, Insects of Paraguay, p. 109-114.

Proceedings for the Year 1854. 8vo. Stockholm, 1855.

Zoology.—(Hammargren) Varieties of colour; a black Lepus borealis and white Turdus pilaris—p. 19-21. (Same) On Parus borealis and the "edge-moult" in birds—p. 216-219. (Mewes) On change of colour in birds; with two plates—p. 258-266. (Malm) Structure of flat-fishes, Pleuronectidæ, more unsymmetrical in appearance than reality; with a plate—p. 173-183. (Retzius) On the drops of oil in the eggs of fish—p. 113-117. (Sundewall) On hybernation of swallows, p. 135-140. (Same) On the condition of animals during the cholera—p. 6-12. (Bohemann) On the condition of insects during the cholera—p. 12, 13. (Same) The metamorphosis of Pipunculus fuscipes; with a plate—p. 302-305. The larva a parasite in the abdomen of different Cicadellinæ. (Stael) The Swedish species of Delphax (thirty in all)—p. 189-197. (Same) New exotic Hemiptera—p. 231-255. (Wallengren) The Swedish species of Corisa (21 in all, 4 new)—p. 140-151. (Same) On Sphinx euphorbiæ L—p. 16-18. (Wahlberg) The humble bees of the North—p. 199-211. (Same) Additions to the Diptera of the North—p. 211-216. (Same) Occurrence of Sphecomyia vespiformis *Gorsky*, in Sweden—p. 151-156. (Thorell) On the male of the rare spider, Scytodes thoracicus—p. 197-199. (Asbjornsen) Marine fauna of the Norwegian coast—p. 121-125. (Liljeberg) Additions to the marine Mollusca of Kullen—p. 18, 19. (Wallengren) The land and fresh water Mollusca of North-eastern Scania—p. 118-125. Botany.—(Agardh) Structure and growth of the stem in Monocotyledones—p. 21-43. (Same) New forms of Algæ (two new genera, Mesotrema, Halopeltis)—p. 107-111. (Fries) First supplement to the Flora Danica—p. 43-46. (Same) Two new Scandinavian plants—p. 255. (Wikström) Pleurospermum Austriacum, a Swedish plant—p. 46. (Wille) Experiments on vegetation (Report by Mosander)—p. 344-355; chiefly relating to the quantity of azote taken up directly from the air. Paleontology.—(Retzius) Fossil os petrosum of a whale—p. 111, 112. Geology, &c.—(Blomstrand) Contributions to the mineral geography of Sweden—p. 296-302. (Ingelström) Minerals from Elfsdal—p. 66-70. (Same) New Swedish minerals—p. 156-159. (Olbers) Analysis of a mineral water containing iodine (in letters to Erdmann)—p. 81-86, 219-224. Review.—(Retzius) Hyrtl on the arterial system of the *Monotrema* (Mem. Acad. Vienna, 1853)—p. 72, 73. Proceedings, &c.

Aarsberaettelse, &c.—Annual Reports on the Progress of Science, viz.—(Bohemann) Natural History of Insecta, Myriapoda, Arachnida, for the years 1851, 1852. 8vo. Stockholm, 1854—pp. 352.—(Wikström) Botany for the years 1845-1848; second part, with appendix; (Forssell) Botanical notes of

travels in Portugal and Brazil, A.D. 1846-1847. 8vo. Stockholm, 1855—pp. 235 and 88.—(Same) BOTANY for 1850, with two appendixes; (Fristedt) Notes of an excursion in Tornea Lappmark, in the summer or 1852; and (Laestadius) Swedish species of Sparganium. 8vo. Stockholm, 1855—pp. 428 and 50.

GERMANY.

DENKSCHRIFTEN DER KAISERLICHEN AKADEMIE DER WISSENSCHAFTEN. MEMOIRS OF THE IMPERIAL VIENNA ACADEMY OF SCIENCE. 4to. Vienna. Math. Natur. History Class. Vol. VI. 1854.

(Brücke) On the Chyle-vessels and Resorption of Chyle, with 2 plates—p. 99–136. (Heckel) Description of *Gymnarchus niloticus* Cuv., with 2 plates—p. 11–20. (Hyrtl) Essays of Comparative Angiology. Fifth Sequel—The Arterial Vascular System of the Edentata, with 8 plates—p. 21–64. (Kner) The Loricata (*Goniodontes Agassiz*) of the Imp. Museum of Nat. History at Vienna. Section I.—Loricarinæ, with 8 plates—p. 65–98. Two new genera are here established, *Acestra* (type *Loricaria cataphracta* L.) and *Hemiodon*. It results from the analysis of the dermal shields of the Loricata, that their solid parts are nearly pure phosphate of lime. In this respect they bear an analogy to the Ganoid fishes. (Reuss) On *Clytia leachii* Risso, a macrurous Decapod of the chalk-formation, with 5 plates—p. 1–10. (Schabus) Monograph of Euclase (History and Crystallography), with 2 plates—pp. 32. (Hochstetter) Crystallography of Rhomboëdric Calcareous Haloid (Kalk-spath), and comparative view of the development of the Tesseral System in Rhomboëdric position, with 2 plates—pp. 36. (Unger) A Fossil Form of the order Osmundaceæ (*Osmundites schemnicensis*), with comparative sketches of the structure of the stem in ferns, with a plate—p. 137-151.

VOL. VII. 1854. (Kner) On the Loricata—continued from Vol. VI., p. 98. Group 2, Hypostomidæ, with 5 plates—p. 251–286. (Reuss) Sketches of the Calcareous Strata of the Eastern Alps, with 31 plates—p. 1–156. (Scmarda) On the Natural History of Egypt, with 7 plates—pp. 28. Contains Infusoria, Polygastrica, Bryozoa, Rotifera, Entomostraca, &c. (Suess) The Brachiopoda of the Kossen Strata (Lias formation of the Eastern Alps), with 4 plates—pp. 37. (Unger) The Fossil Flora of Gleichenberg (in Styria), with 8 plates—p. 157–184. (Same) Notes on the lowest forms of Algæ and their origin, with a plate—p. 185–196.

SITZUNGSBERICHTE DER K. AK. D. WISS. PROCEEDINGS OF THE I. VIENNA ACADEMY. Math. Nat. Hist. Class 8vo. Vienna. Vol. XII. A.D. 1854.

ZOOLOGY.—(Czermack) Physiological Studies—1st. The sense of sight; with 3 plates—p. 322-366. (Diesing) Description of a new Echinorhynchus from a fish (*Naucrates ductor*), with a plate—p. 681, 682. (Engel) On the development of the bones of the Cranium and face, &c., with 3 plates—p. 558-588. (Heckel) Structure and Classification of the Pycnodont fishes, with brief descriptions of new Species—p. 433-464. (Hofstædter) Examination of the fat of the head of Physeter macrocephalus—p. 765-771. (Hyrtl) Notice of a *Chlamydophorus truncatus*, acquired for the Museum of Comparative Anatomy—p. 77-99. (Same) On the connection between the genital and urinary organs in the Ganoid fishes—p. 179, 180. (Same) Anatomy of *Herotis Ehrenbergii*—p. 395-399. (Langer) Vascular system of the Anodontæ—p. 648. BOTANY.—(Fenzl) On the comparative value of the distinctive characters in the genus Cyperus—p. 274, 275. (Pokorny) On the distribution of the Musci Frondosi of Lower Austria—p. 124-137. (Rochleder) On the formation of Carburetted Hydrogen in plants—p. 549-551. (Unger) Contributions to Phyto-physiology—p. 367-396. PALEONTOLOGY.—(Ettinghausen) On the neuration of the leaves of the Euphorbiaceæ, with reference especially to primeval forms, with 8 plates—p. 138-663. The figures illustrating these two papers are exquisite specimens of "nature-printing." (Same) Supplement to the Eocene Flora of Mount Promina in Dalmatia—p. 180-182. (Von Hauer) On the Heterophyllous Ammonites of the Austrian Alps, with 4 plates—p. 861-910. (Reuss) On

Pyroretin, a fossil resin from the Lignite formation of Bohemia—p. 551-554. (Stanek) Fossil resin from Salesel, near Aussig—p. 554-557. (Unger) On the Flora of the Cypridine Slate—p. 593-599. MINERALOGY.—(Boue) On Dolomite, and other calcareous rocks, and the breccian saudstones—p. 422-432. (Grailich) On the fundamental form of Mica—p. 536-539. (Haidinger) On Felsobaryte, a new mineral—p. 183-190. (Same) On Senarmont's Coloured Crystals—p. 400-401. (Same) On the Pleochroism and Crystallography of the Amethyst—p. 401-421. (Same) On Partschin; its Composition and Crystallography—p. 490-484. (Same) On Contorted Rock Crystals—p. 545-548. (Same) Pleochroism of Augite and Amphibole—p. 1,074-1,085. (Same) On the form and colour of Weltzienite; a new mineral—p. 1,086-1,087. (Kenngott) Mineralogical Notes; sequel 9th-13th—p. 22-43, 161-178, 281-303, 685-614, 701-722. (Müller) General extraction of the fundamental equations of Crystallometry—p. 515-526. INTELLIGENCE.—Becker's Figures of edible and poisonous Fungi—p. 281.

Vol. 13, 1854. ZOOLOGY.—(Bassinger) On the structure of the Intestine, and Peyer's glands in the Goose; with two plates—p. 536-555. (Bleiweis, Hyrtl, Fitzinger) Reports on an alleged Hybrid between a stag and cow—p. 141-168. (Diesing) On a natural arrangement of the Cephalocotylea—p. 556-616. The order is divided into two primary sections, according to the form of the Cephalic suckers; which are elongated ("bothria") in the PARAMECOTYLEA, but round ("acetabula") in the CYCLOCOTYLEA. Each of these again is subdivided into two orders, the *Aprocta*, without alimentary canal or anal orifice; the suckers usually in a double row, and the *Proctucha*, with a simple alimentary canal and anal orifice; the suckers in a single row. The second suborder is represented by a single genus of the 1st order; the existence of a corresponding type in the second order being hypothetical. The names applied to the tribes or subordinate divisions are so prolix and uncouth that we are deterred from transcribing them. (Engel) On the formation of the bones of the vertebræ and limbs, with 2 plates—p. 373-399. (Kollar) Economy of the Tabanidæ—p. 631-535. T. quadrinotatus was observed by Mann laying its egg on stems of grass. BOTANY.—(Albini) Chemical Examination of the Chesnut—p. 502-508. (Fritsch) Dates of Vegetation in Austria, A.D. 1853—p. 172-179. (Kawalier) Chemical Composition of *Thyia orientalis*—p. 414-556. (Orth) On the Chinese fruit Wongsky—p. 509-514. GEOLOGY, MINERALOGY, &c.—(Grailich and Pekarek) The Sclerometer, an instrument for measuring the hardness of crystals; with a plate—p. 410-446. (Haidinger) Pleochroism of various crystals of single axis—p. 3-17, 305-331. (Same) On two coloured Geological Maps of Brazil, by Foetterle—p. 355-357. (Hofstædter) On Natural and Artificial Paraffin—p. 437-443. (Kenngott) Mineralogical Notes; Sequel 14th—p. 462-484. (Say) Analysis of the Hildegard Spring at Ofen—p. 298-305. (Same) Analysis of the Mineral water of Lippa, in Hungary—p. 457-462.

Vol. 14, 1854. ZOOLOGY.—(Heeger) Contributions to the Natural History of Insects; Sequel 12th, with five plates—p. 28-41; Sequel 13th; with four plates—p. 273-283. Both illustrating the metamorphosis of various Coleoptera; Sequel 14th; with two plates—p. 365-373. New species of Thysanoptera—(Hyrtl) Concise account of the Osteology of *Chlamydophorus truncatus*—p. 109-315. BOTANY.—(Rochleder) On the Chinese fruit Wongsky, *Gardenia grandiflora*—p. 293-205. MINERALOGY, &c.—(Haidinger) Graphic method of approximative angular measurements, especially in minute crystals—p. 3-8. (Same) Lines of interference in Mica, rings of contact, &c.—p. 295-308. (Same) Approximate calculation of exponents of fracture in Mica and Pennine—p. 330-335. (Kenngott) Mineralogical notes; Sequel 15th; with four plates—p. 243-273. (Nuricsany and Spængler) Analysis of the Mineral water of Roggendorf, in the Bannat—p. 121-125. (Resthuber) On the temperature of the spring of Kremsmuenster—p. 385-396. Schrotter (Occurrence of Oxyde of Zircon—p. 352-357. (Sartorius von Waltershausen) Letter accompanying a present of rare minerals, Parastilbite, &c.—p. 250-392.

Vol. 15, 1855. ZOOLOGY.—(Czermak) Physiological Studies; Part 2—the Senses; with five plates—p. 425-521. (Diesing) Revision of the Cercariae—p.

377-400. Thirty species under nine genera; with a list of 17 species more that are imperfectly known. (Frauenfeld) Essay towards a Classification of Galls produced by insects—255-266. (Freyer) New species of Shells, with a plate—p. 18-28. Seven species of Carychium, one of Pterocera. BOTANY.—(Hlasiwetz) Examination of the roots of *Ononis spinosa*—p. 142-168. PALEONTOLOGY.—(Hauer) On some Fossils of the Dolomite of Mount Salvatore, near Lugano, with a plate—p. 407-417. (Hornes) On the Gastropoda and Acephala of the Hallstadt strata—p. 276-579. (Mueller) *Delphinopsis freyeri*, plate of. (Rolle) The Echinoderms of the Upper Jurassic beds of Nickolsburg in Moravia—p. 521-540. MINERALOGY, ETC.—(Grailich) On a remarkable crystallization of Sal-ammoniac—p. 270-275. (Haidinger) The Superficial and intrinsic colours of Wohler's Sodo-telluric methyle—p. 3-3. (Same) The Stauroscope, an Optico-mineralogical Instrument, by Von Kobell—p. 351-353. (Same) Remarks on the occasional crystalline structure of hammered iron compared with that of Meteoric iron; with a plate—p. 354-360. (Kenngott) Mineralogical notes; Sequel 16th; with 2 plates. p. 234-255. (Leydolt) New method of examining the structure and composition of Crystals, in particular the varieties of Rhomboedric Quartz; with 4 plates—p. 59-81.

JAHRBUCH DER K. K. GEOLOGISCHEN REICHSANSTALT. ANNUAL OF THE IMP. GEOLOGICAL INSTITUTE. 4to. Vienna. Vol. V. Nos. 1-3. 1854.

(Andræ) Report on the results of official Geognostical examinations in Styria and Illyria during the summer of 1853—p. 529-567. (Czjzek) The Rosalia Mountains and the Wechsel, in Lower Austria—p. 465-529. (Same) On the Gradients of Prince Schwartzenberg's wood-float canal in Southern Bohemia—p. 622-630. (Same) Report of the Second Section, on the Geological operations in Southern Bohemia in 1853—p. 263-270. (Haidinger) On Crystals of barytes deposited from a new mineral spring at Karlsbad—p. 142-148. (Same) On two specimens of Red iron ore (hydratic oxyde of iron), with nodules of sparry ironstone, in the Museum of the Institute—p. 183-190. (Von Hauer) On the Composition of some Minerals, and their contents of water in particular—p. 67-87. (Heinrich) Contributions to the Geognostical History of the Moravian Mining District, in the Sudetan Chain—p. 87-107. (Hochstetter) Geognostical Studies of the Bohemian Forest, with a map and plate—p. 1-67; 567-585. (Jokely) On the Metalliferous beds of Adamstadt and Rudolphstadt, in Southern Bohemia—p. 107-116. (Koristka) Report on some measurements of heights in the Zwittawa Valley and South-western Moravia, with a plate—p. 161-183. (Lipold) The Noekel Mine of Nickelberg, in the Leogang Valley, with a geological sketch of this last—p. 148-160. (Same) General Report on the Geological operations of the First Section, in the summer of 1853—p. 253-262. (Same) On the Granwacke formation and the occurrence of Ironstone in the Crownland Salzberg—p. 369-386. (Same) The salt Mine of Dürnberg, near Hallein, with a geological map—p. 590-610. (Same) The Fall of the streams in the Crownland Salzberg—p. 614-624. (Markus) On the Extraction of Silver in Tajowa—p. 406-427. (Melion) Geological communication on the Eastern offshoots of the Sudetan Mountains in Austrian Silesia and Northern Moravia—p. 387-396. (Patera) Economical Method of treating the rich ore of Joachimsdale—p. 611-614. (Peters) The Calcareous Alps of Salzberg, in the District of the Saal, with a plate,—p. 1116-142. (Rolle) Results of the Geognostical examination of the South-western division of Upper Styria, Part i., p. 322-369. (Von Schouppe) Geognostical remarks on the mine of Eisenerz and its environs, with a plate—p. 396-406. (Senoner) Collection of the measurements of heights made in the Crownland Siebenbürgen, to this date—p. 586-590. (Vogl) The New sinking for Silver ore on the Geistergang at Joachimsdale—p. 630-660. (Zepharovich) Contributions to the Geology of the Circle of Pilsen, in Bohemia. Part i., p. 271-322. (Same) Catalogue of the Minerals, Ores, and Petrifactions, received at the Institute—p. 427-430. Proceedings—p. 263-270; 430-464. Operations of the Chemical Laboratory—p. 640-642. Accounts, &c. —p. 642-658.

VERHANDLUNGEN DES ZOOLOGISCH-BOTANISCHEN VEREINS IN WIEN.—TRANSACTIONS OF THE ZOOLOGICAL AND BOTANICAL ASSOCIATION OF VIENNA. Vol. IV. 8vo. Vienna, 1854.

MISCELLANEOUS.—List of members, and proceedings of the association—p. 146, with a plate. (Frauenfeld) Journey to the coasts of Dalmatia in May and June, 1854—p. 445-462. ZOOLOGY.—(Kotschky) The Ibex of South western Asia (*Aegoceros ægagrus*)—p. 201-210. (Schwab) List of the birds of a part of Moravia and Silesia, with notices of the time of breeding and migration, and description of the nests and eggs—p. 487-534. (Hanf) On some rare birds occurring in the environs of Mariahoff, in Upper Styria, and on the change of plumage in the ptarmigan—p. 617-628. (Finger) On *Circaëtos gallicus* Boje—p. 597-600. (Heckel) Systematic catalogue of the fishes of the Salza—p. 189-196. (Frauenfeld) Identification of a carabidous insect described by L. Miller; new rhynchophorous beetle without eyes, described by Schmidt, and some new insects detected by him in the caves of Schiska; with two plates—p. 23-34. (Same) On the preparatory states of *Plinthus megerlei* Pz.—351-354. (Brauer) On the internal structure and metamorphosis of the Neuroptera (*Ascalaphus macaronius* and *Myrmeleon tetragrammicus*); with three plates—p. 463-472. (Kirchner) List of Neuroptera found in the district of Kaplitz in the circle of Budweis in Bohemia—285-316. (Giraud) Notes on Hymenoptera—p. 601-608. (Hornig) Early states of some Lepidoptera—p. 15-22, 541-544. (Same) Notes on Lepidoptera, on occasion of a visit to the Mangert and Rombon Alps in Istria—p. 177-184 (Dorfmeister) On some Zygænæ occurring in Styria—p. 473-482. (Same) Economy of the larva of *Limenitis populi*; with a plate—p. 483-486. (Mann) Enumeration of Lepidoptera collected in an excursion to Upper Carynthia and the Austrian maritime provinces, in May and June, 1854—p. 545-596. (Egger) New Austrian Diptera and other observations on that order; with a plate—p. 1-8. (Egger and Frauenfeld) Natural History and metamorphosis of *Chionea araneoides*; with the anatomy of the larva and perfect insect (by Brauer); with a plate—p. 609-616. (Schiner) Fragments on Diptera—p. 169-176. (Same) List of the Austrian Diptera (p. 1, *Asilidæ*)—p. 355-444. BOTANY.—(Ortmann) Observations on some species of plants, and additions to the indigenous flora of Lower Austria. (Beer) Attempt at a classification of the *Bromeliaceæ*—p. 185-188. (Same) On the function of the aërial roots of tropical Orchideæ—p. 211-212. (Pluskal) Appendix to Phanerogamous flora of Lomnitz—p. 197-200. (Reichardt) List of plants collected in Bohemia by Neumann—p. 253-284. (Neilrich) On *Aconitum stoerkianum* Rchb.—p. 535-540. (Kerner) Contributions to the flora of the Mühlviertel—p. 213-220. (Pokorny) Prolegomena to the cryptogamic flora of Lower Austria, P. 1. Revision of the literature, and systematic enumeration of all the species hitherto recorded—p. 35-168. (Frauenfeld) Enumeration of the Algæ of the Dalmatian coast—p. 317-350. PALEONTOLOGY.—(Hagen) On the Neuroptera in amber—p. 221-232.

VERHANDLUNGEN DES NATUR-HISTORISCHEN VEREINES DER PREUSSISCHEN RHEINLANDE UND WESTPHALENS. TRANSACTIONS OF THE NATURAL HISTORY ASSOCIATION OF PRUSSIAN RHINE-LAND AND WESTPHALIA. New Series. Vol. I. 8vo. Bonn, 1854.

GEOLOGY.—(Roemer) The Calcareous formations of Westphalia, with a geognostic map—p. 29-180. (Dickert) Models of interesting Mountain districts—p. 362-364. (Noeggerath) Pseudomorphous crystals in the shape of common salt, in the oölitic limestone of Eicks in Eifel; with a plate—p. 385-392, and an appendix, p. 458. (Bischoff) Analysis of "Petrified Coal"- p. 378-382. (Same) Analysis of vein stuff from the lowest run of Kunstenflötz, coal formation of Saarbrücken—p. 482. (Schneider) Surfaces of attrition, from Eifel—p. 383-384. (Same) Erratic Blocks of the Lower Rhine—p. 483-484. (Wirtgen) Petrifactions of the Devonian System at Bertrich—p. 372-374. (Wirtgen and Zeiler) Comparative view of the petrifactions of the Grauwacke of the Rhenish Provinces—p. 459-481. (Göppert) Report of a Tour of inspection made in 1850, through

the principal mining district of Westphalia, to investigate the Fossil Flora of its coal formations; with a plate—p. 225-264. (Same) On *Stigmaria ficoides*—p. 220-222. Göppert having obtained entire specimens from the "President Pit" at Bochum, accedes to Steinhauer's opinion that the *Stigmaria* was a gigantic water plant (Victoria Regia?) with horizontal floating arms, attaining a length of thirty feet. Paleontology.—(Troschel) On the Fossil Fishes in the Lignite of the Siebengebirge; with two plates—p. 1-28. The fishes described are nearly all of the family *Cyprinidæ*. An *Esox* has occurred, unequivocally distinct from the existing *E. lucius*. The ray formula D. 3 14; P. 13?; V. 10?; A. 15, C. 6, I. 9, 9, I. 7. The species is provisionally named *E. papyraceus*, but may be identical with the *Esox* from Waltsch, both differing from the living species by the diminished number of vertebræ (48-50). Zoology.—(Foerster) New *Tenthredinetæ*; with four plates—p. 265-350, 421-436. The new species are, of *Hylotoma* one from the South of France; the rest found about Aix-la-Chapelle, viz., *Leptopus*, one species; *Nematus*, sixty-four; *Epitactus* (new genus), one; nearly all illustrated with figures of the characteristic portion of the upper wing. (Fuhlrott) Additions to the list of Birds of the Wupperthal—p. 358. (Stollwerk) Catalogue of the Lepidoptera (Papiliones—Geometræ) found in the District of Crefeld—p. 393-420. Scientific Communications in the General Meeting of the Association at Hagen—p. 449-457. Proceedings of the Society of Natural and Medical Science, for the Lower Rhine, at Bonn: Appendix, p. i.—xxiv. Alphabetical index to the ten volumes of the first series—pp. 6.

Acta Nova Academiæ C. L. C. Naturæ Curiosorum. Transactions (New) of the Imperial Academy of Naturalists. 4to. Bonn. Vol. 24. 1854.

Zoology.—(Bleeker) Some new species of Notopterus from the Indian Archipelago; with five plates—p. 49-62. (Mayer) Anatomy of Rhinoceros indicus; with four plates—p. 1-14 (Neugebaer) Heteradelphy in a young hare; with a plate—p. 15-48. Botany.—(Cohn) On the Embryology of the Microscopic Algæ and Fungi; with six plates—p. 101-256. The author concludes that the Mycophyceæ, if admitted as an order, must remain among the Fungi, with which they agree in their mode of growth, and consequent want of colour; but that the order is not a natural one, embracing representatives of the most various forms of Algæ. In fact, there are no morphological or embryological characters to divide the Algæ, Fungi, and Lichens. The genus Sterconema should be expunged from the cryptogams, being the peduncles of an infusory animalcule, *Anthophysa muelleri* Bonj. The Vibriones in general belong to the vegetable kingdom, and by their mode of growth and want of colour, to the Mycophyceæ. The long straight forms (*bacillus*, *&c.*) are allied to the delicate Oscillariæ; the short ones are of more doubtful place. *Spirochæte plicatilis* is referable to the g. Spirulina. *Bacterium termo* Duj. (for which, as the type of the Vibriones, Perty has established the subkingdom, Phytozoidia,) consists of the liberated and spontaneously moving cells of a plant (g. *Zoogloea* Cohn) allied to Sphaerotilus, and morphologically resembling Palmella and Tetraspora. (Gümbel) Embryology of the mosses; with two plates—p. 575-669. (Kasten) On the structure of Cecropia peltata *L.*; with two plates—p. 79-100. (Milde) New Supplement to the Natural History and Embryology of the Equisetaceæ; with two plates—p. 63-78. Paleontology and Geology.—(Ackner). Geognostical and Paleontological relations of the South-Eastern Siebengebirge and the Hermannstadt basin in particular—p. 897-936. (Glocker) On the Northern diluvium of the plateau of the Oder, about Breslau—p. 409-492. (Same) On Lauka stones; with two plates—p. 723-750. Sphæroidal and cylindric calcareous and marly concretions from Lauka in Moravia; analogous to the Russian Imatra stones, the Markkor of Sweden, the Morpholites of Egypt, &c. (Hensel) On the fossil remains of the genus Arctomys; with two plates—p. 295-306. (Mayer) On diseased bones of primeval animals; with a plate—p. 671–689. *Ursus spelaeus* the subject. (Stenzel) On the stare-stones (Psarolites) of Chemistry; with seven plates—p. 751-896. These fossils, named from the resem-

blance to the speckled breast of the starling, are the remains of *Psaronii* (Polypodiaceæ). Eighteen species of the genus are characterized, and four more noticed, which are imperfectly known. (Vortisch) On geological configuration; with a map—p. 691-722. BIOGRAPHY.—(Dechen) L. Von Buch, his influence on the progress of Geognosy—p. 25.

NEUES JAHRBUCH FUER MINERALOGIE, GEOGNOSIE, GEOLOGIE UND PETREFAKTENKUNDE. NEW ANNUAL OF MINERALOGY, GEOGNOSY, GEOLOGY, AND PALEONTOLOGY. Part 1-4. 8vo. Stuttgart, 1855.

ORIGINAL COMMUNICATIONS.—(Barrande) Ascoceras the prototype of Nautilus; with a plate—p. 257-285. (Same) On the Organic repletion of the siphon of some fossil Cephalopoda; with a plate—p. 365-410. (Cotta) Geological communications, from the Bukowina—p. 25-32. (Dieffenbach) On the Mineral riches of the United States of North America—p. 533-539. (Gutberlet) On Sphærosiderite and Pea-ore in Basalt—p. 166-169. (Same) On the Chronological order of the higher oxydation of the Protoxyde of Manganese and Iron, and the Geological Import of it—p. 430-434. (Kockscharow) On Klinochlorium from Achmatowsk; with a plate—p. 9-24. (Leonard) On Crystallization of Slag—p. 129-151. (Märtens) On the Formation of calcareous Tufa, and the influx of Gypsum springs, in the Valley between Elm and Asse—p. 33-41. (Müller) Some Examples of Pseudomorphism, from Teufelsgrund, Breisgau—p. 411-420. (Philippi) On the occurrence of Meteoric iron in the Desert of Atacama—p. 1-8. (Quenstedt) The Gavials and Ichthyosauri of the Jurassic system in Swabia—p. 421-429. (Roemer) Graptolites, from the Harz; with a plate—p. 240-542. (Zschau) Occurrence of Phosphate of Yttrium in the Granite vein stuff of Norit, in Hitter Island, Norway—p. 513-532. (Strombeck) On the Hils-conglomerate, and the Speeton Clay of Brunswick—p. 159-165. (Volger) The Hemiedry of the Cube and Garnet-hedron—p. 286-287. (Weiss) Elementary Laws of Mechanical Geology; with two plates—p. 288-313. CORRESPONDENCE—p. 42-54; 170-188; 314-337; 435-437; 543-549. EXTRACTS AND LITERARY NOTICES—p. 194-256; 347-384; 444-502; 550-636. (Bosquet) Fossil Crustacea of the Calcareous formation of Limburg (from Transactions of Netherland Commiss., 1854)—p. 60-128. (D'Alton and Burmeister) The Fossil Gavial of Boll, in Wurtemburg (*Mystriosaurus bollensis*); twelve plates—82 pp. Halle, 1854. (Berendt) Primeval remains in Amber. Vol. I.; Part 2. Crustacea—Aptera—128 pp.; with seventeen plates; folio. Berlin, 1854. (Ehrenberg) New Proofs of the more perfect organization of the Polythalamia, from the fossil remains (from the Berlin Monthly Reports, 1855). (Fraas) Notes on the upper white Jura limestone in Swabia (from Wurtemberg Annual Tracts, 1855). (Geinitz) The Petrifactions of the Coal Formation, in Saxony; with thirty-six plates—pp. 67; folio. Leipzig, 1855. (Same) Picture of the fossil Flora of the Coal-basin of Hainich Ebersdorf and Floeha—88 pp.; with fourteen plates; folio; Leipsic; 1854. (Gervais) Zoology and Paleontology of France: Vertebrata. 2 vols, 4to; 80 plates folio. Paris; 1848-1852. (Haime) Description of the fossil Bryozoa of the Jurassic formation (from Memoirs of the Geological Society of France. 1855). (Hall) Paleontology of New York; 4to. Albany. Vol 2. (Heer) The tertiary flora of Switzerland. Vol. 1. Nos. 1-3; with 50 lithochrome plates. Folio; Winterthur, 1855. (Junghuhn) Neptunian Mountains of Java (from Hasskarl's Java). (Meyer) Of the primeval Fauna; section 2—The Saurians of the Muschelkalk. Nos. 5 and 6; with 21 plates; folio. Frankfort, 1854. (Pomel) Systematic and descriptive list of the fossil Vertebrata found in the upper hydrographic basin of the Loire; 8vo. Paris, 1854. (Rosthorn and Canaval) Geognosy of Carynthia, from Annual of the Natural History Museum of Carynthia. Klagenfurt, 1853. (Scheerer) On the pretended Pseudormorphose of Serpentine to Amphibole, Augite and Olivine, from the Intelligence of the R. Gottingen Society of Science; 1854. (De Serres) On the original distribution of plants and animals over the surface of the globe. (from the Memoirs of the Strasburg Museum, 1853).

NAUMANNIA, u. s. w.—ARCHIVES OF ORNITHOLOGY, ESPECIALLY EUROPEAN. Organ of the German Ornithological Society. 8vo. Stuttgart. Vol. IV., 1854.

(Altum) A new (?) small species of Swan; with a plate—p. 145-149. (Same) On the colour of the plumage in general, and the changeable hue in particular—p. 293-304. (Baldamus) Observations and Addenda—p. 24-30. (Behrens) Observations on the beehawk, *Pernis Apivorus*—p. 335-349. (Same) On the capture of birds of prey—p. 350-352. (Bonaparte, Prince C. L.) Notes on the *Laridæ*—p. 209-219. (Brehm) Sketch of the plumage of the European Falcons, and other birds of prey—p. 46-62. (Same) On the pairing of Birds—p. 321-324. (Dehne) Ornithological Observations and Recollections—p. 37-46. (Gebhart) Sketches of the habits of some of the birds of North America—p. 192-194. (Hammargren) Remarks on Brehm's essay On species and sub-species, in the first quarter of the Naumannia for 1853—p. 329-335. (Hartlaub) Preliminary remarks on the small species of Swan, described by Altum—p. 327-329. (Hennecke) On the occurrence and nidification of the stone-thrush, *Turdus saxatilis*, in the Northern Harz—p. 325-327. (Hintz) Extracts from my Ornithological Journal—p. 285-293. (Kjaerbolling) What I wrote, collected, and observed, in the year 1853-4—p. 304-311. (Kunz) Oology in the physiological point of view—p. 194-202. (Baron Kœnig-Warthausen) Notes on *Pica cyanea*—p. 30-32. (Same) Observations on domesticated birds—p. 32-37. (Same) On the breeding of the Ice-bird, *Alcedo-ispida L.*—p. 160-166. (Naumann) Reminiscences of the gradual growth of Ornithology at home, during the first half of the present Century—p. 149-160. (Same) Review of Dubois' coloured plates of the Birds of Belgium and their eggs. Parts 1-30—p. 388-395. (Rhindfleish) A breeding station of *Hirundo rustica* in Germany—p. 191-192. (S.) Contributions to the Anatomy and Physiology of the birds of Europe—1. The bones and muscles of the tongue; with a plate—p. 87-104. (Schach) Occurrence of *Certhia locustella* in Altenburg—p. 344-349. (Speerschmeider) Comparative lists of the Birds in the South Eastern Thuringian forest. and in the neighbourhood of Schlotheim, in North Western Thuringia—p. 175-190. (Staude) Sketch of a natural classification of birds; for the arrangement of the Ornithological collection of the Ducal Museum of Natural History at Coburg—p. 311-318,357-388. (Wallengren) Breeding Zones (topographical limits) of Birds in Scandinavia—p. 62-82, 113-145, 235-285. (Count Wodzicki) Ornithological Notes—p. 82-86. (Same) A word more about *Aquila pennata;* with a Postscript by the Editor—p. 166-174. (Wiepken) Short account of an Ornithological excursion to the Jahdebusen. in June, 1854—p. 352-357. (Zander) On the European Pipits, *Anthus*—p. 1-24. (Zuchold) Literary Intelligence—p. 109-112, 402-416. INTELLIGENCE—p. 105-109, 202-208, 319, 320, 395-402. Extracts from the Bulletin of the Eighth Meeting of the German Ornithological Society, at Gotha—p. 219-235.

WIEGMANN'S ARCHIV FUR NATURGESCHICHTE, u. s. w. WIEGMANN'S ARCHIVES OF NATURAL HISTORY, continued by TROSCHEL. 8vo. Berlin. Vol. XX. 1854. Part I.

(Zenker) Monograph of the Ostracodea; with six plates—p. 1-87, 129-138. (Same) On the Freshwater Cyclopidæ; with figures—p. 88-102. (Same) On *Asellus aquaticus;* with figures—p. 103-107. (Same) Classification of Crustacea—p. 108-117. (Same) Criticism of Erichson's theory of the Homology of members in the Articulata—p.118-128. General conclusions: Erichson's theory of segmentation cannot be applied without great restrictions; a distinction is to be made between absolute (zoological) and relative (physiological) analogy of members; the Arachnida and Crustacea have two pair of antennæ, insects only one; the Pycnogonidæ belong to the Arachnida; the Entomostraca require farther subdivision; the Cypridæ constitute an order by themselves, Ostracodea; the Daphnidæ and Phyllopoda together constitute another order, Branchiopoda; *Argulus* comes next to them, and seems to be again connected with the Malacostraca by the Pœcilopoda (*Limulus*); Argulus and Limulus might, perhaps, be reduced to a suborder, and united with the Branchiopoda in one order, Aspidostraca; the Cyclopidæ should be joined with the Lernæodea as the order Entomostraca; next to

which come the Cirripedia. The affinities of these orders may be best shown by a circular arrangement, thus:—

1. Malacostraca.
2. Trilobita. 7. Ostracodea.
3. Pœcilopoda. 5. Entomostraca. 6. Cirripedia.
4. Aspidostraca.
a. *Argulina.* b. *Branchiopoda.*

(Schlagentweit) Conditions of Vegetation above the mean snow line of the Alps; extract—p. 139-148. (Agassiz) On a new family of viviparous Fishes, Holconoti; translated from the English—p. 149-162. (Reinhardt) On the Swimming bladder of the Gymnotini; translated from the Danish scientific communications of the Nat. Hist. Association of Copenhagen, 1853—p. 169-184. (Gerstaecker) Two new genera of Siphonostomata, Lonchidium and Gangliopus—p. 185-195. These, with other parasites, were found on a shark taken off the west coast of Africa. (Troschel) Contributions to the Natural History of the Pteropoda; with three plates—p. 196-241. Several new species characterised very particularly. (Grube) On the oral organs of the Haustellated Insects; inferences from Gerstfeld's observations—p. 242-246. (Same) Addenda to his Observations on Phyllopoda, p. 247, 248. (Leuckhart) On the Siphonophora of Nice; with three plates—p. 249-377.

Part II., 1854-1855, contains the Annual Reports on the Progress of Natural History, viz., Mammalogy—p. 1-40, by Wagner; Ornithology—p. 31-71, by Hartlaub; Herpetology—p. 109-121; Ichthyology—p. 122-144; and Malacology—p. 145-188, by Troschel; Crustacea, Arachnida, Myriapoda—p. 72-108, and Insects—p. 189-288, by Gerstaecker; Botany, by Grisebach—p. 289.

Berichte ueber die Verhandlungen der Kœnigl. Sachsischen Gesellschaft der Wissenschaften, zu Leipzig. Proceedings of the R. Saxon Society of Science. Math. Phys. Class. 8vo. Leipzig, 1854.

Part 1. (Hoffmeister) On the Fecundation of Ferns—p. 54-56.

Part 2. (Weber) Microscopical Observations on very regular movements, accompanying the formation of resinous precipitates from Alcoholic solutions—p. 57-67. The further prosecution of such observations may throw light on some of the unexplained motions in the cavities of plants and animals. The author designates in particular the circulation of sap in the cells of Chara, etc., and the phenomenon in the vitellus of animals, known as the process of furcation. (Same) A simple and easy method of distinguishing real from apparent death, at an early period—p. 69-81. The test consists in prolonged friction of a small portion of the skin, with a moist woollen cloth or a brush. If life be not actually extinct the skin does not dry up, but reddens, becomes moist and is covered with a thin film. (Same) Comparison of some of the reproductive organs of Phanerogamous plants with those of Vertebrate animals—p. 81-87. (Hofmeister) Contributions to the Morphology of Mosses; with four plates—p. 92-106.

Zeitschrift der Deutschen Geologischen Gesellschaft. Journal of the German Geological Society. 8vo. Berlin. Vol. VI. Parts 1—3. 1854.

(Beyrich) Shells of the tertiary mountain system of Northern Germany. Part 2: Mitra, Columbella, Terebra, Buccinum, Purpura, Cassidaria, Rostellaria, Aporrhais; with 6 plates—p. 408-500. (Bornemann) On *Semionotus* in the upper Keuper-sandstone; with a plate—p. 613-615. (Casseday) Description of a new genus of Crinoids from the carboniferous limestone of North America; with a plate—p. 237-242. (Erman) Some observations on the chalk-formation of the northern coast of Spain; with 2 plates—p. 596-612. (Jentzsch) On localities of heart-shaped binary crystals of Quartz—p. 245-247. (Karsten) The Plaener-formation (upper greensand and chalk marl) of Mecklenburgh; with a plate—

p. 527, 528. (Koch) On the tertiary deposits in Lauenburg and the adjoining district of Holstein—p. 92-98. (Meyn) On the chronology of the paroxysms of Mount Hecla—p. 291-299. (Noeggerath) The Impl Geological Institute of Vienna and the progress of Geology in general in the Austrian States—p. 21-91. (Richter) The Tentaculites of Thuringia; with a plate—p. 275-290. (Roemer) The chalk formation of Westphalia; with a map—p. 99-236. (Rose) On the weather-worn Phonolite of Kostenblatt—p. 300-304. (Wessel) The Jurassic formation in Pomerania; with a map—p. 300-316. (Roth) Borings at Wendisch-Wendingen—p. 522-526. (Scharenberg) Remarks on the geognostic relations of the southern coast of Andalusia—p. 578-595. (Schauroth) A contribution to the Paleontology of the Permian mountain-system of Germany; with 3 plates—p. 539-577. (Semenow) The Fauna of the carboniferous limestone of Silesia. Article 1, The Brachiopoda; with 3 plates—p. 317-504. (Sonnenschein) Occurrence of native gold amalgam in California, p. 243-244. (Spengler) On a fresh discovery of Asphalt in the Permian at Kamsdorf; with a plate—p. 405-407. Proceedings—p. 1-15, 249-263, 501-513. Correspondence—p. 16-20, 264, 274, 516-521.

Abhandlungen der Mathematisch-Physikalischen Classe der Kön. Bayerischen Academie der Wissenschaften. Transactions of the R. Bavarian Academy of Science. Math-Physical Class. 4to. Munich. Vol. VII. Part 2. 1854.

(Roth and Wagner) Fossil remains of Pikermi in Greece; with eight plates—p. 371-464. This deposit, situated on the slope of Mount Pentelicus, afforded Mammalian remains alone, with the exception of a single bone of a bird. Equine remains (Hippotherium) were the most abundant. Among the points of chief interest are the occurrence of two species of ape (Mesopithecus) and of a Macrotherium. Portions of an ox of the largest size (Bos marathonius) and a peculiar species of hyæna (H. eximia) were found, also of a Mastodon and Rhinoceros, but no trace of Dinotherium. Duvernoy, who has published a notice of other remains from the same locality, has recognized a Giraffe also among them.

Entomologische Zeitung herausg. v. d. Ent. Vereine zu Stettin.—Entomological Journal (monthly) of the Entomolgical Association of Stettin. 8vo. Vol. XV.; with Two Plates. Stettin, 1854.

Coleoptera.—(Bach) Notes on Curculionidæ—p. 321, 322. *Rhyncolus pilosus*, n. sp., p. 361, 362. (*Fairmaire*) Apteranillus, n. g. allied to Myrmedonia, but blind. *A. dohrnii*, n. sp. (figured), from Tangier—p. 73. (Gerstäcker) Fifty-seven new species of Apion.—p. 234-261, 267-280. (Habelmann) *Teredus opacus*, n. sp. (figured), p. 27-29. (Kraatz) On Carabi—p. 22-26, 49-52; Synonyms of Carabici—p. 327-330; *Colon armipes*, *zebei*, n. spp., p. 375-378; Staphylinidæ described by Mulsant (Opuscules) and Thomson (Swed. Acad. Trans., 1853); *Gyrophaena laevicollis*, n. sp., p. 176-186; Coleoptera of the Ahrthal. New species—5 of Homalota, 1 of Lithocharis. (Strubing) *Malachius fallax*, n. sp. (*rubidus* Er., according to Kraatz, p. 297)—p. 198-199. (Suffrian) Miscellaneous synonyms—p. 94-96, 148-153.—Figure of *Osphya aeneipennis* (E. Zg. ix., p. 163). Pl. 1, fig. 10. Neuroptera.—(Elditt) Prolegomena to a Monograph of the Thysanura—p. 11-22, 37-45. Replete with information as to the preservation of these delicate creatures, the literature and classification of the group. Hymenoptera.—(Meyer) On pupæ of ants destitute of a cocoon, with a note by Schenck—p. 131-141. (Ruthe) Three new genera of Braconidæ; Dimeris, Araphis, Rhaconotus. *Alysia picticornis*, n. sp.—p. 343-355. (Dutreux) *Papilio Ajax* found in Portugal—p. 142, 143. (Freyer) Notes on Lepidoptera—p. 355-357. (Keferstein) Observations on *Papilio Ajax* and three allied species of N. America.—p. 330. (Möschler) *Pericallia (Ennomos) freitagaria*, n. sp.—p. 143-145 Notes on Lepidoptera of Southern Russia—p. 218-232, 261-264. (Schläger) Critical remarks on Tortrices—p. 52-63, 67-72. (Zeller) *Zygaena ephialtes* a variety of *Z. peucedani*—p. 92-94. Diptera.—(Count Osten-Sacken) Notes on Diptera, with figures. Structure of the last abdominal segment in the male, as a

systematic character in the Limnobiæ; *L. cæsarea*, n. sp.—p. 203-213. Winnertz on *Cecidomyia juniperina* L., and *C. pisi*, n. sp.—p. 322-327. The rediscovery of the long lost and misapprehended Linnean species is interesting. CRUSTACEA.—(Gerstäcker) Two new genera, Eucrotalus belonging to the Scolopendridæ, Sphaeroniscus to the Armadillini; both figured—p. 310-315. MISCELLANEOUS.—(Filippi) Anatomy and Physiology of the Silkworm, translated from the Italian—p. 7-11. (Czech) On the formation of galls—p. 334-343. (Hagen) Southern insects found in the North of Europe—p. 316-319. (Klug) Note on Hermaphrodite insects figured in vol. xiv., pl. iii.—p. 102, 103. (Count Mannerheim) A word more on the publication of detached species—p. 30-32, 46-49. (Siebold) On Hermaphroditism in insects—p. 98-101; On Filariæ, Appendix 4th —p. 103-121. REVIEWS, ETC.—(Dutreux) *Papilio Hospiton* Gené (Extract from Mem. Accad. Torino.)—p. 319-321. (Dohrn) Lacordaire, Coleopteres, Tome 1—p. 201-203. Le Conte, Anthicidæ of U. States—p. 214-217. Coccinellidæ—p. 357-361, 393-396. Eucnemides—p. 163-168. Histrini—p. 74-81. Parnidæ —p. 145-148. (Elditt) List of Coleopterous larvæ described by Chapuis and Candèze—p. 187-198. (Hagen) On the Plates of Scopolis' Entomologia Carniolica (Neuroptera)—p. 81-91. Anatomy of *Periplaneta orientalis*, by Cornelius —of *Blatta germanica*, by Moravitz—p. 378-393. (Zeller) Gladbach's Lepidoptera—p. 168-173. Bremer and Grey's Lep. of Northern China—p. 174-175. Lederer's Lep. of Siberia—p. 175-176. Scientific survey of Algeria (the Lepidoptera)—p. 280-296, 299-310. OBITUARY.—K. J. A. Rennenkampf—p. 158-160. Intelligence; Correspondence; Proceedings of the Association, etc.

LINNÆA ENTOMOLOGICA—JOURNAL (ANNUAL) OF THE ENTOMOLOGICAL ASSOCIATION OF STETTIN. 8vo. Stettin. Vol. IX.; with Three Plates. 1854.

(Suffrian) Catalogue of the Asiatic Cryptocephali—p. 1-169. (Kriechbaumer) Contributions to the history of the Bees of Germany; with a plate.—p. 170-188. The species of Psithyrus, illustrated by the sexual characters. The author has introduced a new term, "talus," for the first joint of the foot, for which the name "metatarsus" is already established in use, although homologically inexact. (Zeller) The Depressariæ and some allied genera; with two plates.—p. 189-403. Depressaria, 63 species; Orthotaelia, 1; Cryptophasia, 5; Cryptolechia, 26; Loxotoma, *n. g.*, 1; Auxocrossa, *n. g.*, 1; Mesoptycha, *n. g.*, 1; Antæotricha, *n. g.*, 5.

LINNAEA EIN JOURNAL FUER DIE BOTANIK IN IHREM GANZEN UMGANGE. LINNAEA, A GENERAL BOTANICAL JOURNAL. Edited by Schlechtendal. 8vo. Halle. Vol. 10, Part IV. 1854.

(Ascherson) A specimen of Phytographic studies of Brandenberg, with a comparison of the Flora of that and the adjoining districts—p. 385-451. Of native plants, 1,687 are enumerated, increased by half a dozen additions in an appendix. (Schlechtendal) Supplementary Observations on the plants cultivated in the Botanical Garden at Halle, in and up to the year 1854—p. 452-488. (Müller and Hampe) The Musci frondosi of Australasia, collected by Müller—p. 489-505. Of 84 species enumerated, 29 are considered to be new. (Sander) The Algæ of Australasia, collected by Müller in 1852 and 1853—p. 505-512. Zoospermeæ, 15; Fucoideæ, 21; Florideæ. Observations on the specific characters of the *Sphacelariae*, from the form of the fruit.

ABHANDLUNGEN DER NATURFORSCHENDEN GESELLSCHAFT IN HALLE.—TRANSACTIONS OF THE NATURAL HISTORY SOCIETY OF HALLE. Vol. II. Part 1–3. 4to. Halle 1854.

(Burmeister) On the species of the genus Cebrio—p. 81-124. (Same) Examination of the types of wing in the Coleoptera; with a plate. (Same) On *Gampsonychus fimbriatus Jorel;* with figures—p. 185-190. (Deecke) On the development of the embryo in *Pedicularis palustris and sylvatica;* with a plate—p. 185-190. (Irmisch) Contributions to the comparative morphology of plants; with 9 plates—p. 31-80. (Krahmer) The mortality tables for the city of Halle during

the first half of the 19th century, with reference to the influence of seasons and epidemics on the rules of mortality, etc.—p. 163-184. (Schlechtendal) Observations on *Amygdalus nanus*, and the genus at large—p. 1-30. Proceedings—pp. 39.

SWITZERLAND.

MEMOIRES DE L'INSTITUT NATIONAL GENEVOIS. MEMOIRS OF THE GENEVESE NATIONAL INSTITUTE. 4to. Geneva. Vol. I. 1854.

(Vogt) On the Siphonophora of the seas of Nice, with 21 coloured plates—p. 1-164.

Vol. II. 1854. (Same) On the Tunicata of the seas of Nice, with 6 coloured plates—pp. 102. Important contributions to Marine Zoology, and illustrated with figures of rare excellence. (Mortillet) Descriptions of new Shells from Armenia, with a plate—p. 5–15.

MEMOIRES DE LA SOCIETE DE PHYSIQUE, ET D'HISTOIRE NATURELLE DE GENEVE, ETC. MEMOIRS OF THE GENEVESE SOCIETY OF PHYSICS AND NATURAL HISTORY. 4to. Geneva. Vol. XIII., Part II. 1854.

(Pictet and Roux) Description of the fossil Mollusca of the Green sand of Geneva;—Part IV., Acephala Pleuroconcha, with 11 plates—p. 279-341.

HOLLAND.

VERHANDELINGEN DER KONINKLIJKEN AKADEMIE VAN WETENSCHAPPEN. TRANSACTIONS OF THE R. DUTCH ACADEMY OF SCIENCE, ETC. 4to. Amsterdam. New Series. Part I. 1854.

(Bleeker) Contributions to the Ichthyological Fauna of Japan—pp. 16; (Vrolik) On the composition of the Core in the horns of Antelopes, with 2 plates—pp. 8. Part II. 1855. (Schroeder van der Kolk) Anatomical and Physiological examination of the intimate composition and function of the Spinal marrow, with 3 plates—pp. 90; (Bleeker) Fishes of Van Diemen's Land, with a plate—pp. 31. List of 844 Australasian species, of which 70 belong to the Fauna of V.D.L., and 39 are peculiar to it. Three new species, and a new genus (of the Cataphracti), *Gnathanacanthus*, described and figured. (Dozy) Anatomy and Phytography of Sphagnum, with 2 plates—pp. 11.

PROCEEDINGS OF THE R. D. ACADEMY, ETC. 8vo. Amsterdam. New Series. Part II. 1854.

(Van Hall) The Metamorphosis a chief element of Natural Classification in the Vegetable Kingdom—p. 63-79; (Schlegel) A Word more on the Dodo and its kindred, with a plate—p. 232–256.

VERHANDELINGEN (NATUURKUNDIGE) VAN DE HOLLANDSCHE MAATSCHAPPIJ DER WETENSCHAPPEN TE HAARLEM. TRANSACTIONS OF THE DUTCH SCIENTIFIC SOCIETY AT HAARLEM. Natural Sciences: 2nd Series. 10th Part. 4to. Haarlem. 1854.

(De Vriese) The *Goodenoviaceæ*. with 38 plates, by Ver Huell: in commemoration of the Centenary of the Society (1852)—pp. 202; (Dozy and Molkenboer) Prodromus of the Bryological Flora of Surinam, together with a fascicle of new species from Venezuela, with 19 plates—pp. 58.

NATUURKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH INDIE. JOURNAL OF NATURAL SCIENCE FOR DUTCH INDIA. Published by the Association of Natural Science in Dutch India. New Series. 8vo. Batavia. Part III. Numbers 1 and 2. 1854.

(Bleeker) Contributions to the Ichthyological Fauna of Halmaheira (in Gilolo) —p. 49-62; (Same) Contributions to the Ichth. Fna. of the Banda islands (third article)—p. 89-114. (Hepp.) The species of Javanese Lichens, from the Zollin-

ger new collection—p. 141-144. (Teijsmann and Binnendijk) On some plants from the Indian Archipelago, reputed to yield Gutta Percha—p. 115–122. (Croockewit) Chemical examination of Coal from the west end of Java—p. 85-88; of pitcoal—p. 123-130. (Fromberg) Guano, its Origin, Chemical composition and Operation as a Manure—p. 63-84. (Von Gaffron) Geognostic table of the Metalliferous beds of Mount Pangaron—p. 145-150. (Rost van Tonningen) Quantitative Analysis of a Mineral water from the Residency Kadoe, &c.—p. 131-136. (Same) Do. from the Residency Rembang, &c.—p. 137-140. Short Communications—Recent Volcanic islands in the Indian Archipelago; Pitcoal dug up at Batjan; Occurrence of Pitcoal at the Kapoeas, western district of Borneo; (Maier) Iron ore from Goenoeng Bessi, W. Borneo; (Von Gaffron) Description of the great Diamond of Mattam, in Borneo; the Coal formation; Gutta Percha from Borneo; Propagation of Coffee by seed; (Martius) On the different sorts of Cardamom of commerce, and on *Amomum danielli*, *volgens*, Hooker; (Bleeker) *Diagramma hæmatochir*—a new species of Ternate Bat; New Mollusca from the Indian Archipelago; Biography of Leopold Gmelin—p. 161-190; Report, Programm, and Minutes of the General Meeting for 1854; New Laws of the Association; List of Members, &c.—p. 1-48; Extract from the Minutes of Council—p. 151-160.

BELGIUM.

ROYAL BELGIAN ACADEMY OF SCIENCE, ETC.

Memoires de l'Ac. R. D. Sc. de Belgique. Memoirs. 4to. Brussels. Vol. XXVIII. 1854.

(De Koninck) On a new genus of Crinoid (*Woodocrinus macrodactylus*) from the carboniferous chalk of England, with a plate—pp. 8. (Same and De Hon) On the Crinoids of the carboniferous strata of Belgium, with 7 plates—pp. 215—comprises an extensive bibliography of the subject. Observations on Periodical Phenomena in Botany and Zoology—p. 79-104.

Vol. XXIX. 1855. (Kickx) Observations on the Cryptogamic flora of Flanders, 5th hundred—pp. 70. (Houzeau) On the Direction and quantity of the Upheavings that have affected the soil of Belgium—pp. 39. Periodical Observations in Botany and Zoology—p. 69-94.

Memoires Couronnees de l'Ac. R. D. Sc. de Belgique. Prize Essays Vol. XXV. Brussels. 1854.

(Chapuis and Dewalque) The Fossils of the Secondary strata of the Province of Luxemburg, with 38 plates, and pp. 325.

Bulletin de l'Ac. R. D. Sc. de Belgique. Bulletin of Proceedings. 8vo. Brussels. Vol. XXI. 1854.

Part I. (Kuechenmeister) On Tænia cænura—p. 206-308; (Lieberkuehn) On Psorospermia, with a plate—p. 160-168. (Poelman) On the System of Circulation in the Crocodilini—p. 67-73. (Spring) On species and varieties; Report on a paper by Mathieu—p. 210-218. Part II. (Van Beneden) On Psorospermia, with a plate—p. 21-23; (Same) On Tænia cænura—p. 306-308. (Same) *Congericola pallida*—a new form of the Caligidæ—p. 583-589. (Dewalque) On the different stages of the Middle and Upper Lias of the Luxemburg—p. 210-228. (Leuckaert) On the Micropyle of the Eggs of Insects, a letter to Van Beneden—p. 655-657. Same) On the Development of the Diptera Pupipara—p. 851-853. (De Selys (Longchamps) Synopsis of the Gomphini—p. 23-112. (Same) Address on the Fauna of Belgium—p. 1020-1050. (Udeken) *Enchytreus ventriculosus*, n. sp., with a plate—p. 853-864. (De Vaux and Dumont) Report on an Essay, by Houzeau—p. 539-548: see the Memoirs, Vol. XXIX., a.d. 1855. (Westendorp) Cryptogamic Plants, lately discovered in Belgium, with a plate—p. 229-246.

Vol. XXII. a.d. 1855. Part I. (Van Beneden) Report on a Note by Kuechenmeister, on Lingatula ferox, with a plate—p. 21–32; (Martens) On the colour of plants—p. 157-179; (Quetelet) The influence of Temperature on vegetation—p. 10-21; 479-490.

APPENDIX TO THE BULLETINS FOR 1853 AND 1854. 8vo. Brussels. 1854.

(Dewalque) On the different stages of the Lower Lias of the Luxemburg—p. 145-171; (De Selys Longchamps) Synopsis of the Calopterygini—p. 1-73; (Wesmael) Ichneumones Amblypygi Europæi, with 2 plates—p. 75-142.

FRANCE.

MEMOIRES DE L'ACADEMIE IMPERIALE DES SCIENCES, DE L'INSTITUT DE FRANCE. MEMOIRS OF THE PARIS ACADEMY. 4to. Paris. Vol. XXIV. 1854.

(Duvernoy) Memoir on a New Classification of the Mollusca Acephala Lamellibranchia, or Bivalves; with 13 plates—p. 3-210. Comprises 30 monographs, presented to the Academy between 1841 and 1852, and here published collectively.

MEMOIRES PRESENTES PAR DIVERS SAVANS. COMMUNICATIONS NOT BY MEMBERS. 4to. Paris. Vol. XII. 1854.

(Bourguignon) Essay, entomological and pathological, on Scabies in the Human subject; with 10 plates—p. 1-168. The anatomical investigation of the male Acarus scabiei, which does not make a furrow in the skin like the other sex, has confirmed the notion of Eichstedt, who had observed this circumstance in 1846. (Durand and Mauvary) On the increase in girth of Dicotyledonous plants; with 4 plates—p. 169-203.

ARCHIVES DU MUSEUM D'HISTOIRE NATURELLE. ARCHIVES OF THE MUSEUM OF NATURAL HISTORY. 4to. Paris. Vol. VII. 1854-1855.

(Duvernoy) New Studies of the Fossil Rhinoceros; with 8 plates—p. 1-144. (Milne Edwards) On some New Crustacea of the Museum; with 8 plates—p. 145-192. (Dumeril) Historical notes on the Menagery of Reptiles of the Museum—p. 193-319. (Pucheran) On imperfectly known types of Passeres Dentirostres, of the Collection of the Museum; with 7 plates—p. 321-380. (Nicolet) Natural History of the Acarina occurring in the environs of Paris; with 10 plates—p. 381-482. An important contribution to the history of the tribe, both in a physiological and systematical point of view. There are described in the present part, of Pelops, 5 species; Oribates, 15; Leiosoma, n. g., 6; Cepheus, 3; Notaspis, 3; Eremaeus, 3; Nothrus, 6; Damaeus, 5; Tegeocranus, n. g., 3; Hermannia, n. g., 3; Hoplophora, 3.

VOL. VIII. PARTS 1 AND 2. 1855.—(Duvernoy) Memoirs on the Anatomical characters of the large Anthropomorphous Apes; in particular the Gorilla, and the Tschego, a new species from Western Africa; with 16 plates—p. 1-248. (Same) Course of Comparative Anatomy—p. 249-272.

ANNALES DES SCIENCES NATURELLES, ETC. ANNALS OF NATURAL SCIENCE, ETC. Fourth Series. 8vo. Masson, Paris.

ZOOLOGY. BY MILNE EDWARDS. Vol. i., 1854. PHYSIOLOGY.—(Bernard) On the Grand Sympathetic, and the effects of the Neurotomy on Animal heat—p. 176-199. (Lereboullet) Comparative Embryology of the Pike, the Perch, and the Crayfish, part i.—p. 237-289. (Morren) Experiments on the absorption of Azote by Animalcules and Algæ—p. 239. VERTEBRATA.—(Aubry) On the Habits of the Gorilla and the Chimpanzee—p. 104. (Bonaparte, Prince C. L.) Synopsis of his System of Ornithology—p. 105-152. (Dareste) Second Memoir on the Convolutions of the Brain in Mammalia—p. 73-103. (Hollard) Monograph of the Balistidæ, part ii., the genera and species; with three plates—p. 41-72, 303-339. (Thomas) On the Generation of *Pelodytes punctatus*, and the Batrachia Anura in general—p. 290-293. ANNULATA—(Van Beneden) Notice of Experiments on the development of the Cysticerci—p. 104. (Dufour) Anatomy of Hymenopterous insects of the Family Urocerata; with a plate—p. 201-236. (Lacaze-Duthiers) On *Bucephalus haimeanus*, a parasite found

in the interior of oysters and cockles—p. 294-302. (De Quatrefages) Report on the Competition for the Grand Prize in Physical Science for the year 1853: Subject—to demonstrate, by actual observations and experiments, the mode of development of the intestinal worms, and of their transmission from one animal to another, and to apply the anatomical and physiological data to the determination of their natural affinities. The prize was awarded to Van Beneden, for an essay embracing the question in its full extent, but more particularly regarding the Trematodea and Cestodea. The successful essay, extending to 575 pages, folio, and an atlas of 92 plates, with nearly 1000 figures, is to be published at the expense of the Academy—p. 5-37. Zoophyta.—(Haime) On *Cerianthus membranaceus;* with two plates—p. 341-389. (Müller) On the general plan of development in the Echinodermata; analysed by C. Dareste; with a plate—p. 153-175. List of New Works—p. 39, 200.

Vol. ii., 1854.*—Vertebrata.—(Blondlot) On the Digestion of fatty substances, and the Digestive process in general—p. 285-320. (Desportes) Longevity of a Pigeon—p. 249-254. The bird lived 26 years, and, in its old age, took to incubation, and reared the young birds. (Hollard) Monograph of the Balistidæ, continued from vol. i., p. 339; with three plates—p. 321-366. (Lereboullet) Comparative Embryology (continued from vol. i., p. 289)—p. 39-80. Annulata—(Van Beneden) Report on Küchenmeister's observations on *Lingatula ferox;* extract from Bull. R. Acad. Belg.—p. 380-382. (Gros) Note on the multiplication of the Nematoidea—p. 36-39. (Lacaze-Duthiers and Riche) On the aliment of some insects inhabiting Galls, and on the production of Fat—p. 81-105. (Philippi) On the Propagation of the Trematoidea; with two plates—p. 255-284. (Quatrefages) On Alternate Generation in Syllis—p. 143-151. (Same) On the Spermatozoa of *Torrea vitrea*—p. 152-154. Mollusca—(Aucapitaine) Observations on the Terebrant Mollusca—p. 367-372. (Lacaze-Duthiers) On the Organization of *Anomia ephippium;* with two plates—p. 5-35. (Same) on the Reproductive organs of the Acephala Lamellibranchia; with five plates—p. 155-248. Zoophyta—(Quatrefages) On the Organization of the Physaliæ; with two plates—p. 107-151. Miscellaneous—On the manifestation of Polarity in the Chronological distribution of Organized beings, by E. Forbes; with remarks by Pictet; extract from Biblioth. Univ. de Geneve—p. 373-379. List of New Works—p. 80, 105, 106.

Vol. iii., 1855.—Physiology.—Memoirs on the origin of the Sugar in the liver and blood of Man and other animals, by Figuier—p. 17-51, 241-255; Bernard—p. 57-61; Leconte, p. 61-64. Lehmann—p. 52-56. Official Report on same, by Dumas—p 316-320. The constant presence of sugar in the liver of carnivorous as well as herbivorous animals being admitted, and that the vena porta also contains sugar after digestion of amylaceous or saccharine matter, the committee appointed to report, applied themselves to determine by experiment the disputed question, Whether the vena porta contains sugar in animals fed on flesh, and whether the blood in the supra-hepatic veins contains sugar, independently of the digestion of vegetable food. The first of these questions they decide in the negative, the second in the affirmative. The report, therefore, without entering into the question, how or from what the liver produces the sugar, tends to establish the conclusions of Bernard, which attribute to that organ a saccharific function, and not one of mere secretion. The reporters have added a caution as to the tests employed to detect the presence of sugar, that all the phenomena of discoloration or reduction produced by organic substances, are fallacious or uncertain. When the sugar cannot be separated in specie, its actual presence should be verified by fermentation and evolution of carbonic acid, and, if possible, by extraction of alcohol from the residuum. (Andral) On some Pathological facts bearing on the production of Sugar in the Animal economy—p. 346-351. (Bourguignon) On the communication of Scabies from animals to man, by contagion—p. 114-120. (Hollard) On the Osteogenic character of the Perforation

* These Annals appear usually about half a year after the nominal date on title-page; which must be borne in mind in any question that may arise as to priority. In like manner, Guerin's Zoological Review is nearly three months behindhand; while the British periodicals are published regularly the beginning of the month for which they are entitled.

often found in the septum of the Olecranium and Coronoid fossæ of the Humerus —p. 341-345. (Longet) On the action of the Gastric juice upon albuminous substances—p. 5-14. (Same) On the action of the Seminal fluid upon neutral adipose substances—p. 15, 16. (Marie) On the numerical relations between the Pulse and the Respiration in adults, in the normal and morbid condition.—p. 379, 380 (Reynosa) On the presence of Sugar in Urine, and the connection of this phenomenon with Respiration—p. 120-153. VERTEBRATA. —(Dareste) Memoir (Second) On the Convolutions of the brain in Mammalia; Sequel; with two plates, p. 65-111. (Same)On the brain of the Rodents, and the Cavy in particular; with a plate—p. 355-365. ANNULATA—(Fabre) On the Anatomy of the reproductive organs, and the embryology of the Myriapoda; with four plates—p. 257-316. In the Juli the mode of propagation is analogous to the singularity observed in the Araneidæ and Libellulidæ; in Geophilus and by analogical inference in the rest of the Chilopoda, impregnation takes place in a mode analogous (with a difference) to that common in fishes. The embryological observations were made on Polydesmus complanatus, Julus aterrimus, Glomeris marginata, Polyxenus lagurus, Lithobius forcipatus, Scutigera araneoides, Crytopshortensis and savignii, Scolopendra complanata, Geophilus ilicis and electricus; and in most cases the development was followed out from the egg through the subsequent stages. (Filippi) New observations on the development of the Trematodea; extract from a letter to Milne Edwards—p. 111-113. ANNULATA.—(Kuechenmeister) Extract of a letter on the transmission of intestinal worms in mankind—p. 377-379. (Lespis) On the spermatophora of crickets; with a plate—p. 366-367. (Leuckart) Letter on some new experiments on the development of intestinal worms; with a plate—p. 351-355. (Saussure) New remarks on the nidification of wasps; with a plate—p. 153. Contains a classification of the different sorts of nests, according to the plan of construction. PALEONTOLOGY.—(Gervais) Description of a fossil fish of the calcareous formation of Drôme; with a list of the fossil fishes of France—p. 321-329. (Same) On the fossil Mammalia of South America; with a plate—p. 330-338. (Same) On a fossil species of Rorqual—p. 338-341. MISCELLANEOUS—(Dareste) On the animalcules and other organized bodies that colour the sea red—p. 179-239. (Same) On the phenomena described by voyagers under the name of seas of milk, and dependent on the presence of phosphorescent animalcules—p. 240-248. NEW WORKS.—p. 256, 380, 381.

BOTANY. By BROGNIART AND DECAISNE. Vol. i., 1854. BOTANY, GENERAL AND PHYSIOLOGICAL.—(Groenland) on the Germination of some *Hepaticæ*; with 6 plates—p. 5-29. (Trécul) On the origin of the perforations in the leaves of some *Aroideæ*—p. 37-40. (Same) On the formation of the vessels under buds, adventitious or normal; with three plates—p. 41-64. (Same) Studies on Victoria Regia, and comparison of its Anatomy and that of Nelumbium and Nuphar; with 3 plates —p. 145-172. (Garreau) On the formation of Stomata in the epidermis of the leaves of the Garden Ephemerum (*Tradescantia*), and the development of the neighbouring cells; with a plate—p. 213-219. (Boussingault) Experiments on Vegetation, particularly with regard to the assimilation of Azote from the atmosphere—p. 241-291. (Trécul) On the vegetation of Nelumbium codophyllum, and the anomalous arrangement of its leaves and stipulæ—p. 291-298. (Personne) Chemical and Natural History of Lupuline—p. 299-312. (Hofmeister) On the Fecundation of Ferns; extract from the Proceedings of the Royal Saxon Society of Science, &c.—p. 371-373. (Weddell) On some Rubiaceæ of Tropical America; with a plate—p. 65-80. (Same) Revision of the family Urticeæ—p. 172-212. List of new Seeds gathered in the Botanic Gardens of Naples, Copenhagen, Zurich, and Geneva —p. 328-333. Addenda of New and rare plants in the Royal Botanic Garden, Berlin, 1853, by Braun, &c.—p. 333-370. SPECIAL BOTANY.—(Fischer and Meyer) New plants collected by Tchiatcheff in Asia Minor—p. 30-36. (Montagne) List of Cryptogamic plants collected by Leprieur in French Guyana, from 1835 to 1849; with a plate —p. 91-144. MISCELLANEOUS.—(Cosson) Account of a Botanical Excursion from Oran to Chott-el-Chergui, in Algeria—p. 220-241. (Dareste) On the Discoloration of the Chinese Seas—p. 81-91. As in the Arabian Gulf, the red colour is owing to the presence of *Trichodesmum erythræum;* and

the same plant has been found at Ceylon also. (Montagne) Report on an Essay on *Sphagna* by Schimper—p. 312-323.

Vol. ii., 1854.—Botany, General and Physiological.—(Brongniart) On the Nectariferous Glands of the Ovary in various families of Monocotyledones; with three plates—p. 5-23. (Clos) On the necessity of banishing the terms *Torus* and *Nectary* from botanical nomenclature—p. 23-28. (Thuret) Inquiries into the Fecundation of the *Fucaceæ*, and observations on the Antheridia of the *Algæ;* with four plates—p. 197-214. (Godron) On the natural and artificial Fecundation of *Aegilops* by *Triticum*—p. 215-222. (Lestiboudois) Anatomical Carpography—p. 223-243. (Weddell) On Cystolites, or calcareous concretions of the *Urticeæ*, and other plants; with a plate—p. 267-272. (Trécul) On the Secondary formations in Vegetable cells, and on Spiral, Annular, and Reticulated formations; with four plates—p. 273-356. (Boussingault) Experiments on Vegetation (continued from Vol. I., p. 291)—p. 257-350. Tending to disprove the assimilation of Azote from the air, unless under peculiar conditions, and in very minute quantity. List of new seeds gathered in the Botanic Gardens of Copenhagen, Hamburg, Turin, Naples, and Geneva—p. 370-382. Special Botany.—(Duchartre) Essay towards a Systematic Arrangement of the Genus *Aristolochia*, with descriptions of 29 new species, and of a new Genus, *Holostylis;* with two plates—p. 29-76. (Tulasne) Second Memoir on the *Uredineæ* and *Ustilagineæ;* with six plates—p. 77-196. (Boissier) Descriptions of New plants collected by Tchiatcheff in Asia Minor—p. 243-255. (Planchon) Affinities and synonyms of some new or little known Genera—p. 256-266.

Vol. iii., 1855.—Botany, General and Physiological.—(Bleeckrode) Note on the Gutta Laho, or new vegetable wax of Sumatra—p. 330-340. The produce of a new species of Ficus, *F. cerifera;* easily soluble in alcohol, ether, and spirits of turpentine; likely to be a valuable article for making candles, even when combined with wax as the principal ingredient. (Fabre) On the Tubercles of *Himantoglossum hircinum;* with two plates—p. 253-291. (Groenland) Note on the Glandular organs of the Genus Drosera; with a plate—p. 297—303. (Hofmeister) Notes on Embryology—p. 209-219. (Hooker) On the function and structure of the Rostellum in *Listeria ovata;* with a plate—p. 85-90. (L. Hermite) Observations on Endosmose—p. 73-84. (Lestibodois) Anatomical Carpography (continued from vol. ii., p. 243)—p. 47-72, 223-253); a minutely particular nomenclature; with explanation of two plates in vol. ii. (Pringsheim) On the Fecundation and Germination of Algæ—p. 363-382. (Von Mohl) On the alleged Triumph of the Theory of Fecundation proposed by Schleiden—p. 219-223. (Schacht) On the Origin of the Vegetable Embryo; with two plates—p. 189-209. (Thuret) Observations on the Fecundation of the Fucaceæ, and the Antheridia of Algæ (continued from vol. ii., p. 192); with three plates—p. 5-28. (Trécul) On the Organization of the pedunculated Glands of the leaves in Drosera rotundifolia—p. 303-311. (Same) On the effect of annular decortication on the Vegetation of Dicotyledonous trees, p. 341-362. Special Botany.—(Montagne) Cryptogamia guyanensis; with two plates—p. 91-144, 311-329. (Nylander) Additions to the Cryptogamous Flora of Chili—p. 145-187. (Planchon) Affinities and Synonymy of some new or little known Genera—p. 292-296. (Tulasne) Characters of some Monimiaceæ—p. 29-46.

Annales de la Societe Entomologique de France. Annals of the Entomological Society of France. 8vo. Paris. Third Series. Vol. 2; with 21 plates. 1854.

(Signoret) Iconographical Revision of the Tettigonidæ (continuation); with 5 plates—p. 5-28, 341-366, 483-496, 717-732. (Bellier de la Chavignerie) Lepidoptera of the Lower Alps—p. 29-49. (Lucas) *Leptalis fortunata*, n. sp., fig.—p. 51-57. (Millière) New Microlepidoptera; with figures—p. 59-68. (Leprieur) *On Hydrophilus inermis*—p. 69-73; advocating its specific rights. (Buquet) *Polybothris lelieuri*, n. sp., fig.—p. 75, 76. (Reiche) Entomological observations—p. 77-81. Cathartus, n. g. of Colydii. *C. cassiae*, n. sp., found in packages of cassia—(The generic name is too like Cathartes). (Rouget) *Lathrobium tarnieri*,

n. sp.—p. 83, 84. (Perris) Insects of the Pinus maritima (continuation, Coleoptera); with 3 plates—p. 85-160, 593-646. (Marseul) Monograph of the Histeridæ (continuation); with 5 plates—p. 161-311, 524-592, 671-707. Hister, 148 species; Epierus, 27 species. (Suffrian) Chrysomelæ of Europe (translated by Fairmaire, continuation)—p. 313-328. (Guèrin Meneville) *Hypoconcha*, n. g. of Crustacea, intermediate between Dromia and Dynomene—p. 329-333. Type, *Cancer sabulosus*, Herbst. (Nylander) On the male of *Psyche helix*, Sieb.—p. 335-339. (Aubé) On the improvement of the breeds of Silkworms—p. 367-371 (Macquart) Diptera of Europe (Tachinariæ, continued); with 4 plates—p. 373-446, 733-754. Tachina, Oodigaster, Clytia, Miltogramma, Apodacra, Heteropterina, Myobia, Demoticus, Labidigaster, Clelia, Erebia, Zophomyia. (Bigot) Attempt at a general and synoptical classification of Diptera (Tipulidii)—p. 447-482. (Fonscolombe) The Ichneumones of Provence (posthumous essay, continued) —p. 497-520. (Reiche) Report on *Elmidomorphus aubei*—p. 521-523; reduced to *Bagous*. (Dufour) Metamorphosis of various Coleoptera; with a plate—p. 647-664. (Chevrolat) *Agrius*, new genus of Carabici—p. 665-668. *A. fallaciosus*, n. sp. from the Straits of Magellan. (Lucas) *Eremobia jaminii*, n. sp. from Algeria; with a plate—p. 709-715. (Boisduval) On two Indian species of Silkworm (*Saturnia ricini* and *paphia*—p. 755-759. Bulletin—pp. cxxviii. Discussion on the genera *Boreaphilus* and *Macropalpus*—p. xviii. Larvæ of S. American Lepidoptera—p. xx. *Halticus pallicornis* injurious to kidney-beans—p. xxxi. *Moronillus*, Jacq. du Val., n. g., allied to *Pitophilus*—p. xxxviii. *Atomaria linearis* injurious to beet—p. xxxix. *Acanthophorus serraticornis* very destructive to the mulberry in the E. Indies—p. xlvii. Habits of Ascalaphus—p. xlviii. Tenacity of Life in reproductive organs of Lepidoptera—p. lxi. New species of Orthoptera from Algeria, etc.—p. lxx. *Rhophites bifoveolatus*, Sichel, n. sp. of bee, found near Paris—p. lxxiv. *Anthophora flabellifera* Lepel., the male of *A. pubescens* Fb.—p. lxxvi. Prodromus of a Monograph of the Ptiniores, by Boieldieu —p. lxxvii-lxxxv. Etc., etc.

Bulletin de la Societe Geologique de France. Bulletin of the Geological Society of France. Part 12. 8vo. Paris. 1855.

(De la Marmora) On the Geological map of Sardinia—p. 11. (Lory) On the nummulitic bed of the Department of the Upper Alps—p. 17. (Gaillardot) Observations made on the Mountains of Lebanon—p. 32. (Omalius d'Halloy) On the Theory of Ejaculations—p. 36. (De Roys) Remarks on do.—p. 42. (Boué) End and use of Geology: extract—p. 46. (Cornuel) Discovery of several fresh water shells in the Neocomian formation of Champagne—p. 47. (Lockart) On a fossil half jawbone of *Mastodon*—p. 49. (Mengy) The Calcareous formation in the Departments of the North Aisne and Ardennes; with a plate, and Remarks by Delanoue—p. 54. (Bourjot) On the Transition rocks of the Pyrenees, and the Valley of Ossau in particular—p. 68. (Treger) On the Lower Oolite of England, and of Department of the Sarthe—p. 75. (Hebert) On the Jurassic Formation of the Western edge of the the Paris basin—p. 79. (Koechlin Schlumberger) On impressed Flints —p. 87. (Renevier) Parallelism of the lower Calcareous formation of the Arrondissement of Vassy, Upper Marne, with those of Western Switzerland—p. 89. (Same) Stratigraphic study of the Nummulitic Formation of the Alps of the Vaud and Wallis—p. 97. (D'Archiac, Visct., and Haime) Summary of 2nd No. of the Description of fossil animals of the Nummulitic group of India—p. 104. (Boué) On the Antiquity of Volcanic Eruptions; Extract of letter—p. 109. (Omalius D'Halloy) Remarks on do.—p. 111. Observations on Instruments of Flint found at St. Acheul, near Amiens—p. 113. (Abich) Geological Notes on several parts of Russia; correspondence—p. 115. (Koechlin Schlumberger) On two varieties of Ammonites; with 2 plates—p. 118. (Coquand) Geological Description of the the Permian Formation of the Department of Aveyron, and the environs of Lodève and Hérault—p. 128. (Etray) On Rotten beds of Quarries—p. 152. (Barrande) On *Ascoceras*, the prototype of the Nautili—p. 157. (De Ronville) Discovery of a new deposit of fossil fishes at Beaufort, near Crest, Drôme—p. 178. (Casiano de Prado) On the Geology of Almaden, part of Sierra Morena, and the

mountains of Toledo; with a plate—p. 182. (Rozer) Geological Memoir on the French Alps; with a plate—p. 204. (Gas) On the Geological constitution of the Anthraciferous Formation of the Alps, and the difference between it and the Jurassic formation; with two plates—p. 253. (Daubrie) Experiments on the Artificial production of Silicates and Aluminates—p. 299. (Gaudry) Analysis of published accounts of Volcanic Eruptions of the Island Hawaii—p. 306. (Martius) On the erosion of calcareous rocks by atmospheric agents; with a plate—p. 314. (Sismonda) On the Geological constitution of the Maritime Alps and some mountains of Tuscany—p. 320. (De Beaumont) Remarks on the preceding—p. 332. (Dancour) On Perowskite found in the Valley of Zermath—p. 332. Remarks on the preceding—p. 335. (Gaillardot) Geological description of Mount Djebel, Khaisoûn, North of Damascus—p. 338. (Charrel) Letter on a fact which may indicate the Geological epoch of the formation of some Grottos and Caverns—p. 349. (Hebert) On some singular Fossils of the Paris basin—p. 349. (Agassiz) On the development of Organized beings; Letter to De Beaumont—p. 353. (Barrande) Report on Memoir by Kjerulf, on the Silurian basin of Christiania—p. 356. (Delanoue) Simple mode of verifying the presence of Iron, Magnesia, and Manganese in Dolomites, marly and calcareous—p. 311. Langel on the cleavage of rocks—p. 363.

Memoires de la Societe Imperiale des Sciences de Lille. Memoirs of the I. Scientific Society of Lille. 2nd Series. Vol. I. Paris, 1855.

(Macquart) New Exotic Diptera, 5th supplement; with 6 plates—p. 25-156. Chiefly from the collection of Mr. Bigot, of Paris. (Same) Herbaceous plants of Europe and their Insects; Sequel to the Trees, &c., 2nd part—p. 157-330. Presentation by Mr. Macquart to the Museum of the Society of his Entomological Collection and Library of Natural History—p. 430-436.

Memoires de la Soc. Geol. de France. Memoirs of the Geological Society of France. 2nd Series. Vol. I. Part I. Paris, 1854.

(Coquand) Geological Description of the Province of Constantine; four plates, and 20½ sheets of letter-press. (Haine) Description of fossil Bryozoa of the Jurassic Formation; six plates and 7½ sheets.

Memoires de l'Academie des Sciences, etc., de Dijon.—Memoirs of the Dijon Academy of Sciences, etc. Scientific Section for 1854. 8vo. Dijon, 1855. (Brullé) On the History of the discovery of the Circulation of the blood—p. 79-83. On the claim that has been advanced for P. Sarpi as the discoverer. (Rouget) List of the Coleoptera of the Cotè d'or—p. 85-144. The land and water carnivorous beetles.

ITALY.

Memorie della Reale Accademia della Scienze de Torino. Memoirs of the R. Turin Academy of Science. New Series. 4to. Turin. Vol. XIV. 1854.

(Ghiliani) List of the Lepidoptera of the Kingdom of Sardinia—p. 131-247. Many new species described. (Gennari) A Century of new plants of Liguria—p. 249-273. (Figari and De Notaris) Agrostographiæ Aegyptiacæ fragmenta. Part 2. Grasses of Egypt and Nubia; with twelve plates—p. 317-391. Sixty-two species described, of which twenty-seven new.

Giornale dell' I. R. Instituto Lombardo, etc. Journal of the I. Lombard Institute of Science, etc. 4to. Milan. Vol. VI. 1854.

(Calderini) Microscopic observations on parasitical *Mucedineæ* of the grape—p. 31-44. The author agrees with the Reporters, that Amici, in his essay, had con-

founded some other plant with the true *Oidium tuckerii*. (Cornalia) Zoological notes on *Pachypleura edwardsii*, a new Saurian (Acrodont) from the Triassic strata of Lombardy; with two plates—p. 45-58. Report on the competition for the prize for an essay on the anatomy of the silkworm. Prize awarded to an essay by Cornalia—p. 108-123.

ENGLISH.

THE ANNALS AND MAGAZINE OF NATURAL HISTORY; including Zoology, Botany, and Geology. No. 94, October; No. 95, November; No. 96, December, 1855. 8vo. With Plates. London: Taylor & Francis. Price, 2s. 6d. each.

No. 94, October.—(Dr. Alexander Braun, Professor of Botany in the University of Berlin) The Vegetable Individual, in its relation to Species. (John Lycett) Note on the Sub-genus, Limea, Bronn. (Lucas Barrett, F.G.S.) Notes on the Brachiopoda observed in a dredging tour with Mr. M'Andrew, on the coast of Norway, in the summer of the present year. We find the following observations, in reference to the Terebratula caput-serpentis. Individuals remaining attached to any object, manifested a remarkable power and disposition to move on their pedicles; detached specimens could be moved about, without causing the animal to close its valves. If any of the protruded cirri were touched, the cirri were retracted and the valves closed with a snap, but soon after opened. Only on one occasion was a current observed to set in on one side, between the rows of cirri. (R. Leuckart) On the young states of some Annelides; with a plate. William Clark) Observations on the Genus Assiminia. (M. E. Germain de Saint-Pierre) On the Morphology of the organs called Lenticels. Bibliographical notices. A Manual of British Marine Zoology. Proceedings of learned Societies: Zoological Society, May 9, ; June 13, 1854. Linnean Society, February 6; March 20. Description of the Peachia Hastata, a new genus and species of the class Zoophyta; by P. H. Gosse. April 3. T. Bell, President, in the chair. Miscellaneous: Sibbald's Drawings of Scottish Animals, by the late Dr. George Johnston. Clausilia Rolphii: Helix aspersa: Descriptions of some new species of Birds, by the Viscount Du Bus de Gisignies: On the Operculum of Diplommatina, by Capt. Thomas Hutton: Note on the Aphyllanthes Monspeliensis, by M. Parlatore: Meteorological Obssrvations and Table for August, 1855.

No. 95, November.—(P. H. GOSSE, A.S.S.) Notes on some new or little known British Animals. We have here descriptions of a new animal belonging to the class Arachnida, and two belonging to the Annelida. (Robert Warrington) On the iujurious effects of an excess or want of heat and light on the Aquarium. Mr. Warrington warns us never to allow the temperature in our aquaria to fall below 50° F. or to rise above 70° F. (T. Williams, M.D., London, F.L.S.) On the Mechanism of Aquatic Respiration, and on the Structure of the Organs of Breathing iu Invertebrate Animals. After an absence of some seven months, the author once more appears in the arena of natural science, and concludes a somewhat lengthy paper by saying that "he will explain, on another occasion, how much that is old and how much that is new is contained in these observations. In succeeding papers they *will* be supported by a large mass of anatomical details of great interest, and hitherto, he believes, unknown to naturalists. (Rev. Hamlet Clark, A.M.) Notice and Description of a new species of Spider. The spider in question is named Salticus Blackwallii, after that well known arachnologist, Mr. Blackwall. (Robert Warington) Observations on the Habits of the Stickleback. (Dr. A. Braun) The Vegetable Individnal, in its relation to Species. Bibliograpical notices: Glaucus, or the Wonders of the Shore. Proceedings of Learned Societies: Linnean Society, May 1, 1855; June 5. Read the first of a series of Memoirs, by the President, entitled, "Horæ Carcinologicæ," or Notices of Crustacea. Part I. The Leucosiadæ. Zoological Society, June 27, 1854; July 25. Read a paper on the Anatomy of the Great Ant-Eater, by Professor Owen. Miscellaneous.—Bohemian Forests and Peat Bogs, by Dr. Hochstetter:

Occurrence of Diodonta Fragilis at Weymouth, by W. Thompson: Description of a second species of the Genus Procnias, by P. L. Sclater, A.M.; Description of some new species of Birds, by the Viscount Du Bus de Gisignies: Description of a new species of Petrogale, by Dr. J. E. Gray. Meteorological Observations and Table for September, 1855.

No. 96. December.—(Charles C. Babington, A.M. F.R.S.) On the Batrachian Ranunculi of Britain. (Thomas Williams, M.D., London, F.L.S.) On the mechanism of aquatic respiration, and on the structure of the organs of breathing in Invertebrate animals; with a plate. (Dr. J. E. Gray, F.R.S., &c.,) On the genera of mollusca, and on the genus assiminia in particular. (Thomas Davidson, F.G.S.) A few remarks on the Brachiopoda; with a plate. (William Clark) On the phenomena of the reproduction of the chitons. What form the young chiton might assume was always of great interest to the naturalist—did it pass from the ova into an intermediate larvar condition; or had it always the true chiton form, even when immature? For want of knowledge on this subject the chitons have not only been tossed from class to class among the mollusca, but also from the order mollusca itself, and were placed by Blainville among the Annellidan articulata. From all these facts, the importance of chronicling every investigation about these animals will be clearly seen. On the 23rd of last July, Mr. Clark placed several specimens of chiton cinereus in saucers filled with salt-water. On the day of capture one of the animals discharged a quantity of ova, not in volleys but by one or two every second for at least fifteen minutes, forming a batch of 1,300 to 1,500, many more remaining in the ovaria; they were of a pale yellow colour, but globular form, being a little compressed at their axes, and about 100th part of an inch in diameter; they were attached by means of a viscid fluid. On the 24th July, they still remained inert at the bottom of the saucer. On the 25th, they had all become detached from their nidus, and *swam* with *great vivacity* through every part of the water, and crossing the large saucer in 30 or 40 seconds. As soon as the motion commenced the ova lost the sub-globular figure, and assumed that of a sub-elongated oval approaching the chiton shape. On the 30th, they had altogether cast off the embryonic covering, and exhibited the complete form of the chiton, and at this period they appeared to lose their natatory powers. (C. C. Babington, M.D., F.R.S.) Note on Linaria sepium *Allman*. Bibliographical notices: Catalogue of the genera and sub-genera of birds in the British Museum: Descriptive and illustrated catalogue of the Histological series contained in the Museum of the Royal College of Surgeons. Vol. II.—Proceedings of Learned Societies: Zoological Society, July 25, 1854. Miscellaneous—On the Shropshire mollusca, by J. Gwyn Jeffreys: On the arrested development of the Tadpole of the common Frog, by W. Davies: List of species of mollusca obtained by Professor Goodsir, from Spitzbergen, by Mr. R. Andrew. Meteorological observations and table for October, 1855. Title page to Volume XVI.

Quarterly Journal of Microscopical Science. No. 13, October, 1855. 8vo. Price 4s. With Woodcuts and Lithographic Illustrations, London. S. Highley, 32, Fleet-street.

(W. Gregory, M.D., F.R.S.E.) Notice of some new species of British freshwater Diatomaceæ. (G. Busk, F.R.S.) An account of the structure and relations of Sagitta Bipunctata. This little animal, which has the form of a pointed needle, is from one to two inches in length, and is as transparent as the clearest glass, in warm calm weather, it swims on the surface of the sea, and occasionally in the most surprising numbers; at such times it may be procured without difficulty, by means of a small towing net over the side of the boat. Its minute size, and the extreme delicacy and transparency of its tissues, make it peculiarly an object of microscopical investigation. In our latitudes it appears to be in a state of the most complete maturity in August and September. With respect to its systematic position, authors are still very much in doubt. Mr. Huxley places it among the annulose animals; but says that the study of its development can alone decide to which sub-division of the Annulose kingdom Sagitta belongs. (John Gorham, M.R.C.S.E.) On the

magnifying power of short spaces, illustrated by the transmission of light through minute apertures. (F. H. Wenham) Notes and observations on the sap circulation of Plants. (F. Currey, A.M.), Hartig on the Phytozoa of Antheridia. (J. W. Bailey) On a Universal Indicator for the Microscope. Translations. On the Impregnation and germination of Algæ; by M. Pringsheim. On Sphærozoum Noctiluca and the Polycystinæ; by Professor Muller. On the development of the Spermatozoids in Torrea vitrea; by M. A. de Quatrafages. On the influence of Dilute Sulphuric Acid on the deposit layers of the Cell-Wall in its earliest condition; by Dr. T. Hartig. On the calcareous concretions in Urticaceæ and other Plants; by H. A. Weddel. Correspondence. The circulation in Aqueous Plants. Aperture of Object-Glasses; On the Structure of the Frond of Polysiphonia Fastigiata. Remarks on the Fly's Foot. Microscopic Preparations. Proceedings of Societies.—Microscopical Society. Zoophytology.

The Zoologist. No. 156, October; No. 157, November; No. 158, December, 1855. 8vo. London: John Van Voorst. Price 1s. each.

No. 156, October:—(R. Knox, M.D., F.R.S.E.) Contributions to the Philosophy of Zoology. Part I.—On the Relation of Species or Race to Genus or Natural Family; a question of transcendental anatomy. (H. T. Stainton) Entomological Botany (with more especial reference to the plants frequented by the Tineina. (Hamlet Clark, A.M.) Synonymic List of the British Carnivorous Water Beetles, together with Critical Remarks and Notices of Foreign and Allied Species. We would heartily commend the remarks by the Rev. H. Clark, with which this paper opens. Sure we are that much remains to be done among the "water beetles." When our rivers and lakes, rivulets and pebbly brooks, when our marshes and ditches, and, in fact, every locality that contains water, no matter in what quantity, are investigated, we will be unable to arrive at anything like a just appreciation of the number of these insects. Proceedings of Society—Entomological Society, September, 3, 1855. (C. R. Bree) Birds killed by Cold. (John Dutton) Occurrence of the Bee-eater in the Isle of Wight, and disappearance of the Chough from the same locality. (Henry Doubleday) White Swallow. (T. J. Bold) Occurrence of Cross-bills in Northumberland and Durham. (C. R. Bree) On the double-broodedness of Gonepteryx rhamni. (Rev. Joseph Greene) Is Gonepteryx rhamni double-brooded? (J. Scott) Note on Argynnis lathonia. (W. Machin) Note on the breeding of Notodonta dictæoides. (T. J. Bold) Capture of Scolytus destructor in the North of England. (C. Fox) The vinegar Polype. Notices of New Books—Annals and Magazine of Natural History.

No. 157, November:—Notices of New Books—Monograph of British Bees; The Natural History Review, No. VII.; Quarterly Journal of Microscopical Science, No. XI.; Manual of British Marine Zoology; Annals and Magazine of Natural History. (H. T. Stainton) Entomological Botany, with more especial reference to the plants frequented by the Tineina. (J. F. Brockholes) Hedgehog devouring its young; on the Cuckoo; and on a valuable Hen. (T. Bramley) Hoopoe at Low Layton. (E. H. Rodd) Occurrence of the Rose-coloured Pastor; and solitary Snipe, near Penzance. (W. S. M. D'Urban) The Spotted Crake and Avocet on the Exe; the Great American Snake caught. (Edward Newman) Notes on the Loach, the Gudgeon, food of Fishes; on transparent Fishes; and on the supposed Male of the Argonaut. (J. C. Dale) Scorpion taken near Dorchester. (J. J. Reading) Lepidoptera taken near Plymouth. (F. Sharpe) Occurrence of Colias edusa and hyale near Brighton. Remarks on the double-broodedness of Gonepteryx rhamni, by E. Shepherd, C. W. Watkins, Henry Doubleday, and H. J. Hardings. In bringing this controversy to a conclusion, the originator of it, Mr. Newman says, "I can now positively state, from my own observations, made during 1855, that Gonepteryx rhamni is only single-brooded. (C. W. Watkins) Unusual abundance of Vanessa Io. (W. H. Hayward) Capture of the larva of Deilephila galii and Stauropus fagi at Devonport. (J. C. Dale) Reputed British Butterflies. (J. N. Winter) Capture of Leucania musculosa and Phlogophora empyrea at Brighton. (J. F. Brockholes) Note on

the habits of Epunda lichenea. (C. Miller) Note on the Tinea granella. (J. C. Dale) Arcturus sparshalii, an Australian insect; and on the occurrence of Acrida standishii and Delphax longipennis at Glanville's Wotton. (E. Newman) Occurrence of Lithocolletis bremiella in Britain, of Scolytus destructor in Lancashire, of Rhizotrogus ochraceus in Wales, of Melolontha Hippocastani in Scotland; of the capture, near London, of a Coleopterous insect new to Britain; and a note on Colymbetes dispar of Bold. Proceedings of Societies—Entomological Society, Oct. 6, 1855; Society of British Entomologists, Aug. 7, Sept. 4, 1855.

No. 158, December:—(Arthur Hussey) Deer feeding on the fruit of the horse-chestnut (J. Gardiner) Occurrence of the Cursorius isabellinus on Salisbury Plain. (E. H. Rodd) Note on the common Heron. (L. Lester) Occurrence of a supposed new Wrasse and other Fishes in Swanage Bay; (E. T. Higgins) On a supposed new Flounder. (W. T. Bree) Double-broodedness of Gonepteryx rhamni. (C. R. Bree) Memorandum on Gonepteryx rhamni. (J. N. Winter) Occurrence of rare Lepidoptera at Brighton. (G. Guyon) Occurrence of Mononychus pseudacori in the seeds of Iris fœtidissima, and on the curious effect of a Magnet on Flies. (John Curtis, F.L.S, &c., &c.) Notes on the Dytiscidæ. In these notes Mr. Curtis gives it as his opinion that it is to the northern districts of Scotland and to the western shores of Ireland that the attention of entomologists should be directed, in order that they may be enabled to make additions to this portion of our Fauna. In setting the specimens, Mr. Curtis gives, what we think, a valuable hint—viz., that one specimen of a species should always be placed on its back, in order to show the peculiar characters of its under side. Owing to the smoothness of the Elytra this is often not easy; but a drop or two of nitric acid will tend to harden the gum. (R. Hislop) Note on Melolontha Hippocastani. (H. Edwards) Entomological Museum and Society at Melbourne. (C. Fox) On the Vinegar Polype (Plant?) Notices of New Books —Quarterly Journal of Microscopical Science, Part XII. (Edward Newman) Occurrence of the Trochilium scoliæformis.

Hooker's Journal of Botany, and Kew Garden Miscellany. No. 81, October; No. 82, November; No. 83, December, 1855. 8vo. London: Lovell Reeve. With Plate. Price 2s. each.

No. 81, October:—(James Motley) Notes written on a voyage from Singapore to Banjermassing, and letter to Sir W. J. Hooker. We give the following extract:—"I now continue the journal of my Sumatra excursion, which I was obliged last time to break off in the middle of a day, from a sudden alarm of the mail closing; a sort of thing we are very subject to in these out-of-the-way places. I think I left myself, in the afternoon of January, '29, at the little settlement of Pulo Jumahat. About five o'clock we stopped at a deserted garden to cook; it was a jungle of young fruit trees and sago-palms, and many trees of a handsome *Erythrina*, full of the pendent nests already described; the trunks, however, were too thorny to be climbed. There was also a curious *Ficus*, bearing its fruit in large, dense bunches on the stem and branches. The men were tired, but to stop was out of the question, from the number of mosquitoes. Near this place I observed a beautiful *Trichosanthes* in fruit; the pepos were of the size of an orange, and bright scarlet, hanging in long festoons from branch to branch of the trees. I saw here also, for the first time on this river, the beautiful little *Caryota furfuracea*, with its elegant, adiantiform leaves; it is often planted by the natives for the sake of the cottony pubescence which covers the leaf-sheaths, and which is used for caulking boats, and also for tinder; it is called "Cuput." Another Palm, however, whose name I do not know, I think a *Wallichia*, yields it in greater quantities; and in Java it is procured from an *Areca*. The banks are completely lined with the large *Musa* called "Pisang batu;" it has probably been planted originally, but is now perfectly wild, growing abundantly among the trees. I am inclined to believe that this is the original species of the cultivated Pisangs; it is cultivated everywhere by the natives, and is very constant in its appearance and character; unlike the other varieties, it is always full of seeds, although they are often abortive: it is coarse and hard, but has a flavour somewhat resembling a Burgundy pear. The natives

consider it to contain more nourishment than the other kinds, which I think probable, as it has more of the fecula. Just at dark we passed a small island, called Pulu Kamudi. As night came on, the mosquitoes arrived, and in such numbers as I have never seen before or since; the air was filled with them like a cloud; they bit through trousers, stockings, and jacket like gauze. At last I put on a pair of long hunting-boots, and two thick flannel shirts, and wrapped up my head in a coarse towel; even then I could not sleep. The men had not this protection, and, though very much tired, they preferred pulling on to attempting to go to rest. No one who has not felt it, can conceive the misery and irritation caused by these insects when they are really bad; and the Malays, who generally have skins invulnerable to them, say that the rivers on this coast are the worst in the world for them. After several hours' pulling they became more tolerable, and we made fast for the night. The night was foggy, and I had just put my rifle into its bag, to save it from damp, when a tiger showed himself on the beach, but he went away before I could again get at the gun.

30th. We were off very early this morning, The river is visibly narrower, and the stream stronger, but still there are no signs of a hill, or even a bank. We passed another island to-day, called Pulu Lys: it is covered with large jungle, and was formerly a burial-place for the Europeans who died here, while the Dutch had an establishment at Indragiri. A little higher up are the remains of the house of the Resident, who was removed a few years ago, chiefly, I believe, on account of the extreme unhealthiness of the place in the dry season. We are now evidently approaching the haunts of men: the jungle generally has been cut, and, instead of trees, the river is bounded by large floating beds of luxuriant green grass and reeds, sometimes fifteen or eighteen feet high; behind are rice-fields, extending a mile or two from the river, which again are backed up by the long, dark line of primeval forest. Here and there, wallowing and splashing through the water, are droves of ungainly-looking buffaloes, with their never-failing companions, the white egrets, or padi-birds, perched upon their backs. There are now also a good many houses near the river, with a few Plantains, Kaput (*Eriodendron*), and Drabas (*Psidium*), about them. The people seem to make great use, for fishing, of small rafts constructed of the *Musa* stems, which are very buoyant. Bamboos, up to this point rather uncommon, begin now to form a feature in the landscape; the commonest are the yellow-stemmed Bamboo gading, and a very bushy, thorny, and crooked kind, which would make excellent fences. At two P. M. landed at a small campong, called Seligi: here there was a considerable quantity of a small, pink-flowered *Indigofera*, which gives a good dye, but in small quantity." Notes on the Cultivation of Cotton in the Yoruba Country, Western Coast of Africa, by the late Dr. G. Irving. The Voyage of H. M. S. Herald. Second General Report of the Government, Botanist of Victoria, on the Vegetation of the Colony. In concluding this most interesting report, Professor Mueller says: "Looking finally to our future prospects, as afforded us by the enjoyment of the serenest climate and by the extensive fertility of the soil, I venture to say that no praise too high can be bestowed in a general view on the productiveness of our adopted country. We possess, in the Southern Hemisphere, what the ancients in the Northern called "regiones felices," those happy latitudes of a warm temperate zone in which nature, with a prodigal hand, offered prominently, amidst so many other gifts, the Cerealia, the Olive, and the Vine, and to which we here have added from the far East, the Orange and the Tea; from India, the Rice; and from the New World, the Maize, Cassava, Arrow-root, Tobacco, and so many other treasures of the vegetable world, on which mankind now rely for luxury and support. All these may here be successfully produced, along with those which we enjoyed in the country of our youth, and will, I trust, with the mighty resources of our mineral wealth render this country one of the most delightful and prosperous in the world.—Botanical Information; Extracts from the Jurors' Reports on some of the Vegetable Products of the Madras Exhibition of 1855. Plants of Madeira. Notices of Books. Natural History of Ferns. Ferns of Great Britain, nature printed.

No. 82, November:—Observations on Gleicheniaceæ and Cyatheæ of Java, by Mr. J. K. Hasskarl, communicated in a letter from Java, dated July, 1855.

(Charles L. Zeyher) Botanical Notices of a Journey into the interior of Southern Africa, in company with Mr. Burke. (Mr. Nathanial Wilson) On the Useful Vegetable Products, especially the Fibres, of Jamaica Asplenium Fontanum—a British Plant? by Sir W. J. Hooker, K.H., F.R.A. and L.S. Botanical Information—Extracts from the Jurors' Reports on some of the Vegetable Products of the Madras Exhibition of 1855, continued from p. 316. Costus afer. Ker.—a reputed Specific against Nausea. De Candolle's Prodomus. Note on Clusiaceæ, by Mr. Spruce. Notes of New Books.

No. 83, December:—(George Bentham, F.L.S.) Notes on the Roogee of Kumaon—Megacarpæa polyandra. This is a most interesting account of this curious Polyandrous cruciferous Plant; seeds of which were forwarded to the Glasnevin Botanic Garden, near Dublin, in 1849; they speedily germinated, and attained a great size, but did not flower until towards the end of April, in this present year. Botany of Victoria (Southern Australia.) Extracts of Letters from Dr. F. Mueller. (Charles L. Zeyher). Botanical notices of a journey into the interior of Southern Africa, in company with Mr. Burke. (Sir W. J. Hooker, F.R.S., &c.) Catalogue of Mr. Geyer's Collection of Plants gathered in the Upper Missouri, the Oregon Territory, and the intervening portion of the Rocky Mountains. (Dr. F. Mueller) On two new umbelliferous Plants, from the Alps of South-eastern Australia. Botanical Information—Mr. Spruces's Ascent of the Amazon to Peru.—Dr. F. Mueller's appointment to be Botanist to the north-west Australian expedition. Note on the application of British Rushes in Sussex, by W. Borrer, F.L.S. Note on the proposed Genus Fitchia of Dr. Meisner. Notices of Books.—Folia Orchidacea, by Professor Lindley.

THE NATURALIST: a popular monthly Magazine, with numerous Engravings; conducted by B. R. Morris, Esq., M.D. No. 56, October. No. 57, November. No. 58, December, 1855. 8vo. Price 6d. each. London: Messrs. Groombridge.

No. 56. October.—(J. M'Intosh) Notes on the Common Squirrel (Sciurus Vulgaris.) (Edward Parfitt) A List of and Notes on the Fungi found in the neighbourhood of Exeter. (W. Westcott) Occasional Notes. (William Kidd) Nature's Holiday, shared with Two of her Loving Children. (Rev. F. O. Morris) The Variety of the Hawk, figured in the "Naturalist" for September. (F. M. Burton) Extracts from Correspondence with a Brother Naturalist. (T. Edward) A list of the Zoophytes found on the coast of Banffshire. Reviews.—The Bee-Keeper's Manual; Labels for the British Star Fishes. Miscellaneous Notices.—Heronries; a White Blackbird and a White Thrush; Note on the Wokhab; Sea Swallows; Cuckoo attending to its own Young; Thrushes and Starlings feeding upon the backs of Sheep

No. 57. November.—(John S. Stone) Notes on the Rook (Corv frugillgus). (William Kidd) Domestic Pets: the common Squirrel (J. O. Harper) On the Anatomy of the Crested Cariama. (G. Stockley) Notice of the species of Carabus occurring around London. (O. S. Round) Characteristics of common birds. The propagation of Hardy Trees and Shrubs, continued from p 17, Vol. IV. Order XXI. Aquifoliaceæ. (George R. Twin) A contrast. (T. Lyster) Summary of the weather for April and May, 1855. Review—Introductory Textbook to Geology. Retrospect. Miscellaneous Notices.—Occurrence of the Bee-eater in the Isle of Wight; Disappearance of Choughs from the Isle of Wight; Additions to the Ornithology of Sussex.

No. 58. December.—(J. Longmuir, Jun.) Occurrence of the Esquimaux Curlew (Numenius borealis) in Scotland. (H. Smurthwaite) Notes on the gray shrike, the dipper, and the chough. (W. Bridger) Notes from a bird-nesting expedition to the south of Holland. (W.) Contributions to a list of the cryptogamous Flora of Banffshire. (J. S. Walker) Down the River. (A. Lucas) Diurnal Lepidoptera found in the neighbourhood of Luton Beds. Reviews.—The Natural History of the Tineina. The Natural History Review. Miscellaneous Notices.—The Crystal Palace; Robins; Song of the autumn Robin; Picus major; Crossbill; Variety of the Pink underwing; Callimorpha Hero; Retrospect; Querist; Title-page and Index to Vol. V. 1855.

GERMANY.

ALLGEMEINE DEUTSCHE NATUR. HISTORISCHE ZEITUNG, NEUE FOLGE. GERMAN UNIVERSAL NATURAL HISTORY JOURNAL, under the direction of the Isis Society of Dresden. New Sequel. 8vo. Vol. I. Hamburg: 1855.

ORIGINAL ARTICLES.—MISCELLANEOUS.—(Reichenbach) Retrospective views of the principles of physical investigation—p. 29-69. (Rabenhorst) Remarks on Baudrimont's essay on the microscopic organisms of the atmosphere—p. 475, 476. (Kluge) The earthquake of July, 1855, in Switzerland—p. 345-355. (Brehm) The forests of the Tropics and their Fauna—p. 209-237. (Dehne) Sketches of the Natural History of Mexico, in letters—p. 313-319. (Klocke) Excursion to the island of Jorsand, west coast of Denmark—p. 319-324. (Matthes) Excursion from N. Orleans to the aboriginal forest of the Red river in Texas—p. 152-162. (Von Welck) Excursion in the North of Scandinavia—p. 355-374, 380-404. (Brehm) Artificial Incubation, in Egypt and Austria—p. 473-475. (Küchenmeister) Translation of Haime's essay on pisciculture, with additions—p. 129-152. (Reichenbach) The swarming of bees, as a subject for police regulations—p. 194-199. (Sussdorf) Influence of certain manufactories on the atmosphere, on animals, and plants—p. 97-116. (Rabenhorst) Microscopical analysis of the water of Bad Elster—p. 116, 117. GEOLOGY and PALEONTOLOGY.—(Otto) Geological controversies—p. 469-472. (Same) Hypothetical view of the upheaving of the Spitzenberg—p. 183-186. (Müller) The Porphyry of the district of Leisnig; with a plate—p. 70-82. (Kluge) Craters of elevation—p. 337-344. (Otto) Fossil worms; with figures—p. 307-312. (Same) *Cycadites schmidti*, from the lower new red sandstone of Saxony—p. 162, 163. ZOOLOGY.—(Dehne) Natural History of Psammomys obesus, Mus decumanus, musculus, Hypudæus subterraneus, Myoxus speciosus, Mus sylvaticus, Micromys agilis, Talpa europaea, Vespertilio noctula, Sorex chrysothorax (Crocidura thoracica, according to Reichenbach—p. 242), Vesperus discolor, Vesperugo alcythoe, savii, Musculus mollissimus, Crocidura aranea, Crossopus fodiens—p. 163-166, 169-183, 237-242, 432-439, 443, 444, 476-479. (Same) Natural History of Loxia leucoptera, bifasciata, Halieus carbo —p. 439-442. (Brehm) Birds as foster-parents—p. 404-407. (Reichenbach) Chelonians of the North-east U. S. of N. America—p. 82-87. (Matthes) Hemibatrachia in general, and those of N. America in particular—p. 249-280. (Hennig) Natural History and Anatomy of botts, the larva of *Œstrus equi*, *ovis*, *capreoli*; with two plates—p. 297-307. (Küchenmeister) Transformation of *Cysticercus cellulosæ* into *Taenia solium*, in the human intestine; *Taenia cœnurus* the origin of the flukes of sheep, &c.—p. 186-194. (Reibisch) Catalogue of the Mollusca of Saxony—p. 409-432. (Same) Varieties of Helix nemoralis and hortensis—p. 283-292. BOTANY.—(Rabenhorst) *Empusa muscae*, *culicis*, *mycetophilæ*, parasitic fungi, fatal to Dipterous insects—p. 377-379. (Same) Cryptogamic Flora of S. Africa, fungi, algæ—p. 280-283. BIOGRAPHY.—(Reichenbach) Memorials of King Frederick Augustus the Second of Saxony—p. 1-29. SHORT COMMUNICATIONS, EXTRACTS, ETC.—p. 118-128, 166-168, 199-208, 242-248, 292-296, 325-336, 375, 376, 407, 408, 445-448, 479-488. (Drechsler) Distribution of rain within the Temperate zone—p. 127, 128. (Schlosser) Climate and vegetation of the Croatian coast—p. 482, 483. (Jobard) Cure of long and short-sightedness—p. 326, 327. (Rossmaessler) Nature-printing—p. 375, 376. (Rousseau) Anatomical photography—p. 336. (Foetterle) Subterranean course of rivers—p. 325. (Dufrenoy) The Bogagem diamond—p. 205, 206. (Prestel) Crystalline structure of hammered and meteoric iron—p. 328-330. (Haidinger) Review of Dana's Mineralogy—p. 166, 167. (Haidinger) Skeleton of Irish elk—p. 295, 296. (St. Hilaire) Eggs and bones of the gigantic bird of Madagascar, *Struthionanax*—p. 325, 326. (Otto) Succinic earth in anthracite—p. 123-125, 445-447. (Ehrenberg) Remains of Polythalamia in green sand—p. 204, 205. Infusoria, &c., from the depths of the ocean—p. 243, 244. (De Selys) Mouse of the Abruzzi—p. 448. (Dureau de la Malle) Domestic animals, their return to a wild state—p. 481, 482. (Matthes) Snakes of N. America—p. 123. (Gerstaecker) Coleoptera of Mozambique—p. 201, 202, 245. (Ehrenberg) Persistence and revival of life in the lower animal forms—p. 246-248. (Weddel) Flora of the higher Andes—p. 376.

(Braun) *Pleurocladia lacustris*, a fucoid of fresh water—p. 335, 336. (Same) *Chytidrium*, a parasitic plant—p. 334, 335. Meeting of German Naturalists in 1855—p. 296. Memoir of De la Beche—p. 242, 243.

Reviews.—Schmidt, Book of education, in letters to parents: Kothen: 1854—p. 89-93. Mayo, the truths of popular superstitions, &c., translated by Hartmann: Leipzig: 1854—p. 9. Meyer, The heavens and the earth; 2nd edition: Leipzig: 1855—p. 45, 46. Schinz, Investigation of the changes in the velocity of rotation of the heavenly bodies: St. Gall: 1855—p. 20, 21. Zeise, The infinity of the great and little material world: Altona: 1855—p. 101-104. Fechner, Physical and philosophical doctrine of Atoms: Leipzig: 1855—p. 73-76. Cornelius, Doctrine of Electricity and Magnetism: Leipzig: 1855—p. 43-45. Blassman, Prelude to speculative Natural History: Leipzig: 1855—p. 61-63. Neuling, Practical elementary Physics: Wiesbaden: 1855—p. 59. Schleiden, Studies, popular tracts: Leipzig: 1855—p. 4, 5. Müller, Views of Nature in all its kingdoms and zones: Stuttgart: 1855—p. 9, 10. Klenke, The Natural sciences during the last fifty years: Leipzig: 1855—p. 6-8. Hinrich, Life in Nature: Halle: 1854—p. 6. Rossmaessler, The four seasons: Gotha: 1855—p. 66-68. Barth, Blindness curable by the application of Geranium robertianum; 2nd edition: Cassel: 1855—p. 86. Huschke, The skull, brain, and soul, of men and beasts: Jena: 1854—p. 1-4. Schacht, The microscope and its application; 2nd edition, enlarged: Berlin: 1855—p. 37-39. Schlosser and Vukotinovic, Geognostic-botanical narrative of travels through the Croatian coast, &c.: Agram: 1854—p. 84, 85. Brehm, Travelling sketches of North-eastern Africa: Jena: 1855—p. 100. Proceedings of the Zoological Society of London—p. 86, 87. Bulletin of the French Zoological Society of Acclimatisation—p. 87. Guèrin-Meneville, Review and Magazine of Zoology—p. 86. Newman's Zoologist—p. 79, 80. Agassiz, Gould and Perty, Popular Zoology—p. 57-59. Kner, Lessons of Zoology, for the use of advanced classes; 2nd edition, remodelled: Vienna: 1855—p. 93-96. Kolenati, Zoology for teachers and scholars: Brünn: 1855—p. 10, 11. St. Hilaire, Domestication and naturalization of useful animals; 3rd edition: Paris: 1854—p. 80. Nördlinger, The little enemies of Agriculture, or injurious insects and worms, &c.: Stuttgart and Augsburg: 1855—p. 53-55. Günther, The fishes of the Neckar: Stuttgart: 1853—p. 16. Holbrook, Ichthyology of S. Carolina: Charleston: S. C.: 1855—p. 66. Rapp, The Fishes of the lake of Constance: Stuttgart: 1854—p. 65. Dalbohm, Hymenoptera of Europe, especially of the North; Vol. I. and II.: Berlin: 1845, 1854—p. 14, 15. Fischer, Orthoptera of Europe: Leipzig: 1854—p. 71, 72. Gerstaecker, Systematic arrangement of the Coleopterous family Rhipiphoridæ: Berlin: 1855—p. 72. Graessner, The Entomologists of Europe, Asia, and America: Jena: 1855—p. 78. Koch, The Geographical diffusion of European Lepidoptera in other quarters of the world: Leipzig: 1854—p. 15, 16. Koch, Aphides, accurately figured and described from the life; in parts: Nurnberg: 1854:—p. 82, 83. Melsheimer, Catalogue of the described Coleoptera of the United States; revised by Haldeman and Le Conte: Washington: 1853—p. 52, 53. Mulsant, Minor Entomological Works: Paris: 1854—p. 77. Mulsant, Natural History of the Coleoptera of France, Heteromera Latigenia: Paris: 1854—p. 77, 78. Staudinger, The Sesiæ of the environs of Berlin; with two plates: Berlin: 1854—p. 82. Yersin, New Orthoptera of the South of France; extract from the Bulletin of the Vaudois Society: Lausanne: 1854—p. 83. Zenker, Anatomical and Systematical studies of Crustacea; with six plates: Berlin: 1854—p. 16. Hermannsen, Index of the genera of Mollusca; new edition: Cassel: 1855—p. 71. Gegenbaur, On the doctrine of Alternate generation. and the propagation of Medusæ and Polypi; with two plates: Wurzburg: 1854—p. 80-82. Schultze, On the organization of Polythalamia; with seven plates: Leipzig, 1854—p. 17-19. Baumgärtner, Rudiments of the physiology of the production of plants and animals: Stuttgart: 1855 (Rchb.)—p. 49-52. Sendtner, The phytological circumstances of Southern Bavaria, delineated according to the principles of Botanical Geography: Munich: 1854—p. 12-14. Treviranus, Application of wood-engraving to figures of plants: Leipzig: 1855—p. 52. Dietrich, Universal Flora, in coloured figures; new series: Jena: 1855—p. 69-71. Ambrosi, Flora of Trent: Valsugana—p. 85. (Perini) Flora of Northern Italy, represented

by nature-printing: Trent: 1854:—p. 85. Schmidt, Figures of more than thirty thousand species of plants, &c.; new and cheaper issue, edited by Dietrich: Jena: 1855—p. 83, 84. Miquel, Flora of Dutch India; with fifty plates: Leipzig—p. 85, 86, 97. Steudel, Synopsis of the Cyperaceæ, Restiaceæ, Eriocauloneæ, Xylrideæ, Desvauxieæ, Junceæ: Stuttgart: 1855—p. 97. Rabenhorst, Course of studies of Cryptogamia: Dresden: 1855—p. 33, 34. Same, Collection of European Hepaticæ—p. 98. European Lichenes—p. 99. Algæ of Saxony: Dresden: 1855—p. 99. Döll, The vascular Cryptogamia of Baden: Carlsruhe: 1855—p. 69. Courtin, Culture of native and foreign Ferns and Lycopodia: Stuttgart: 1855—p. 68, 69. Büchner and Kirsch, Fungi, in coloured models: Hildburghausen: 1854, 1855—p. 100, 101. Becker and Hartinger, Diagrams for schools; Fungi, six plates: Olmutz—p. 11, 12. Goldenberg, Fossil Flora of the coal-formation of Saarbrück; part 1, with six plates: Saarbrück: 1855—p. 41-43. Goeppert, Tertiary Flora of Schossnitz in Silesia; with twenty-six plates: Görlitz: 1855—p. 25-29. Ettinghausen, the Eocene Flora of Mount Promina; with fourteen plates: Vienna: 1855—p. 59-61. Fallou, The arable soils of Saxony, investigated and classified, &c.; 2nd edition: Leipzig: 1855—p. 34-37.

New Works—p. 21-24, 30-32, 39, 40, 46-48, 55, 56, 63, 64, 72-88, 96-104.

The critical portion of this journal, in particular, appears to be conducted with a genial and candid scientific temper; and it affords a fair view of the present direction of the philosophizing spirit of natural history in Germany.

Verhandlungen des Natur-historischen Vereine der Preussischen Rheinlande und Westphalens. Transactions of the Natural History Association of Prussian Rhineland and Westphalia. New Series. Vol. II. 8vo. Bonn, 1855.

Geology.—(Dechen) Geognostic view of the district of Arnsberg—p. 117-225. (Marck) Media of petrifaction of the Polythalamia—p. 259-262. Iron pyrites and silica are here added to the media previously determined, viz., carbonate of lime and glauconite. (Same) Chemical examination of rocks of the Upper cretaceous formation of Westphalia—p. 263-282. (Same) Protocarbonate of iron occurring in sedimentary deposits—p. 283-290. (Same) The Quartz crystals of Hussley, their matrix and origin—p. 291, 292. (Zeiler and Wertgen) Observations on the petrifactions of the old Devonian system of the Rhine, in particular the species occurring about Coblentz.—The Echinoderms of the environs of Coblentz, and of the calcareous rock of Eifel; with thirteen plates—p. 1-28, 79-85. New species, *Asterias rhenana*, *Rhodocrinus gonatodes*, *Platycrinus nodosus*, *fritillus*, *Poteriocrinus rhenanus*, *curtus*, *Actinocrinus prumiensis*, *Ceramocrinus (n.g.) eifeliensis*, *Epactocrinus (n.g.) irregularis*. *Coccocrinus* Müller, n.g., type *Platycrinus rosaceus* Roemer. Botany.—(Beckhaus) Contributions to the Cryptogamous Flora of Westphalia—p. 64-78. (Bonninghausen) *Tillæa muscosa* L. a Westphalian plant—p. 292-297. (Schaffner) Observations on Spongilla fluviatilis—p. 29-32. (Same) On the Natural History of the self-moving spores of Algæ—p. 32-39. Zoology.—(Bartels) On Gammarus pulex in the human stomach—p. 113-115. In a note appended (p. 115, 116), Troschel questions the evidence of this Crustacean having lived in that situation. (Forster) Second century of new Hymenoptera—p. 226-258. Twenty of the hundred are given in the present part. They are of various families, and mostly Hungarian, from the collection of Friwaldsky. Two new genera of Ichneumonidæ are characterised, *Ctenochira and Xenodocon*, and one of Vespidæ (?) *Aclastocera*, which, among other singularities, combines the short mandibles and two-spurred posterior tibiæ of the social wasps, with the toothed ungues of the solitary (Eumenidæ). Miscellaneous.—Classified catalogue of Natural History articles in the Transactions of Societies for the years 1852 and 1853—p. 86-108. Proceedings of the Association—p. 70. Proceedings of the Society of Physical and Medical science of the Lower Rhine, meeting at Bonn—pp. 80.

Entomologische Zeitung herausg. v. d. Entom. Vereine zu Stettin. Entomological Journal (monthly) of the Entomological Association of Stettin. 8vo. Vol. XV.; with portrait of Klug, and three Plates. Stettin, 1855.

Coleoptera.—(Bremi-Wolff) New Swiss species; Polydrosus penninus, Cassida alpina, Rhytirrhinus alpinus, Teretrius hispidulus, Ebæus perspicillatus,

Meloe rufipes, Omias neglectus—p. 196-200; Ptinus otti—p. 329, 330. (Dietrich) Pæderus geniculatus, paludosus, n. spp.—p. 200-203, 358. On some species of Cicindela—p. 334-336. (Endrulat) Additions to the Coleoptera of the Lower Elbe—p. 185-187. (Gerstæcker) On Curculionidæ; Hypoglyptus pictus, n. g., n. sp., from Corfu—p. 167-174. (Hoffman) Sphærius acaroides, oral organs, &c.—p. 194, 195. (Kraatz) Staphylinidæ, &c., of Mulsant's Opuscules Entomologiques, part 2—p. 20-24, 165, 166; Of Wollaston's Insecta Maderensia—p. 166, 167. New species of Tachinus—p. 25; Of Oxypoda, O. micans, soror, assimilis, rugatipennis, græca, longipennis, all European, mostly from Greece—p. 330-334. Synonymic remarks—p. 24-28, 372, 373. (Kriechbaumer) Summary of the families and genera of Zebe's Synopsis of the Coleoptera of Germany—p. 116-124. On some Cicindelæ—p. 214, 215. Reputed Swiss insects—p. 215. (Pfeil) Additions to the Fauna of Pomerania and Brandenburgh—p. 305, 306. (Schmidt-Goebel) Additions to Zebe's Synopsis—p. 212-214. (Scriba) Gyrinus suffriani, Trogophlæus myrmecophilus, n. spp., both German—p. 280-282. New Staphylinidæ, found in bales of tobacco from Venezuela—p. 295-302. (Suffrian) Synonymic remarks—p. 275-280. (Zebe) Cryptocephalus saliceti, n. sp., found on Salix caprea, in the County of Glatz—p. 28, 29. LEPIDOPTERA.—(Kellner) On the earlier states of several species—p. 336-339. (Moschler) On *Heliothis nubigera* Friwaldsky—p. 211. (Mueller J.) Pale variety of Melitæa didyma; larva of Vanessa v. album; with a plate—p. 108, 109. (Prittwitz) Occurrence of European Lepidoptera in America—p. 36-39. Relation between the colours and geographical distribution of Lepidoptera—p. 175-185. (Standfuss) Lepidoptera of the coast of Spain and Sicily—p. 151-163. (Staudinger) Contributions to the Lepidopterous Fauna of Upper Carynthia—p. 374-379. (Zeller) Gladbach's figures—p. 59-63, 94-96. The Lepidoptera of Scopoli's Entomologia Carniolica—p. 233-257. HAMENOPTERA.—(Boje) Miscellaneous observations; many new species—p. 48-51, 89-94, 97-108. (Menzel) *Dicelloceras vibrans*, n. g., n sp.; with a plate—p. 270-274; is an Encyrtus allied to *Cerapterocerus mirabilis* Westw. (Nietner) Economy of Eumenes saundersii—p. 223-226. This is the only species of the genus in Ceylon which makes its nests in houses, and there in the most exposed situations, as on tables, chairs, &c. The brood is often destroyed by a parasitic larva, probably one of the Ichneumonidæ. (Ruthe) Grypocentrus, n. g. of Ichneumonidæ, allied to Orthocentrus; four species, all new—p. 51-58. Dimeris, n. g. of Braconidæ—p. 327-329. Notes on Ichneumonidæ; Chalinocerus mancus, Phytodiætus elegans, Tryphon aberrans, Trachyderma breve, n. spp.—p. 79-89. Braconidæ; Exothecus discolor, Ascogaster pallida, n. spp.—p. 291-294. DIPTERA.—(Loew) New species from Greece; Cyrtosia obscuripes, Stenopogon græcus, Trypeta strigilata, T. macrura—p. 39-41. HEMIPTERA.—(Hagen) The Cicadæ of Europe—p. 340-368, 379-386. (Mink) Livia crefeldensis, n. sp.—p. 370, 371. NEUROPTERA, ETC.—(Hagen) On the numbers and distribution of the Odonata (Libellulæ L.)—p. 131-136. Attempt to determine the Phryganidæ of Pictet—p. 204-210. Of the whole one hundred and twenty, sixty-two are considered to be determined with certainty; of the rest, forty are entirely unknown to the essayist. On the g. Oligoneuria; with a plate—p. 262-270. *O. rhenana* Imhoff, the European species, is distinguished from *O. anomala* Pictet; the latter from Brazil. Orthoptera from the Crimea—p. 109-111. MISCELLANEOUS.—(Bremi) Ravages of Thrips hæmorrhoidalis—p. 313, 314. Disease of carrots—p. 317. Destruction of Aphides—p. 317-319. Introduction and diffusion of insects by importation of new plants—p. 320-325. (Christoph) Insects observed in high Northern latitudes—p. 111-113. (Dohrn) Notes on Nomenclature—p. 163-165, 286, 287. (Hagen) Crops of beans and peas injured by a sp. of Limnothrips—p. 312, 313. (Kawall) Entomological notes from Courland—p. 227-232, 260-262. (Roger) Entomological notes; Sitophilus orizæ destructive to rye; Insensibility to cold, of various insects; Use of chloroform—p. 302-312. (Stein) Notes on nomenclature—p. 282-286. PROCEEDINGS of the Association—p. 33-35, 65-67, 129, 130, 188, 189, 193-259, 295-325, 327. Programme of the thirty-second Meeting of the German Naturalists and Physicians, in Vienna, A.D. 1855—p. 217-223. RE-

VIEWS and EXTRACTS.—Endrulat and Tessien, Catalogue of Coleoptera found about Hamburg (Dohrn)—p. 29-31. Le Conte, Synopsis of the Scydmænidæ of the U. S. (Dohrn)—p. 17-20. Ghiliani, *Saturnia nurag.* n. sp. extract from the Memoirs of Turin Academy (Dutreux)—p. 78, 79. Græssner, List of living Entomologists—p. 136-141. Haliday, Notes on nomenclature: extract from Proceedings of Dublin University Zoological Association (Dohrn)—p. 287-290. Keller, Synopsis of the Lepidoptera of Wurtemberg (Hering)—p. 304, 305. Koch, Lepidoptera of the Wetterau; Isis, 1848 (Heyden)—p. 41-47, 294; Anticritique (Koch)—p. 113-116. Koch, on the diffusion of European Lepidoptera in other quarters of the world (Zeller)—p. 68-72. Menzel, on the ravages of Athalia centifoliæ, and on the Tenthredinetæ in general; Zurich, 1854. The Natural History of the Hivebee; Zurich, 1855. The formations of chitine in the Arthropoda; Zurich, 1855 (Hagen)—p. 75-77, 306, 307. Tessien, Catalogue of Lepidoptera found about Hamburg and Altona; Hamburg, 1853 (Hering)—p. 302, 303. OBITUARY.—Jenison-Walworth—p. 15, 16. Sepp.—p. 16, 17. Dieckhoff—p. 35, 36.

LINNAEA ENTOMOLOGICA. JOURNAL (ANNUAL) OF THE ENTOMOLOGICAL ASSOCIATION OF STETTIN. 8vo. Vol. X.; with two Plates. Stettin. 1854.

(Hagen) Monograph of Termites—p. 1-144, 270-325. Historical account and literature of the family, including a critique of the British Museum list. The arrangement and characteristic of the species, it is presumed, will be given in the next volume. (Zeller) Supplement to the Monograph of the g. Cryptolechia in the preceding volume—p. 145-168. Of twenty new species of the Berlin Museum, sixteen are here described, and the wings of eight are figured. (Same) The species of g. Butalis—p. 169-269. The species described amount to forty-nine; viz., *Hypatima* two, *Butalis* forty-seven; of the latter, ten new; three from N. America, B. eboracensis, basilaris, impositella; two from Palestine, B. clavella, inertella; the rest European, B. disparella, pascuella, tergestinella, palustris, hornigii. The wings of four are figured. (Westwood) The Goliathidæ of the New world—p. 326-328. A second species is here made known, *Ischnoscelis dohrni*, and both this and *I. hoepfneri* illustrated with figures. (Dohrn) *Loxoprosopus ceramboides* Guerin; with figures of both sexes—p. 329-339.

DENKSCHRIFTEN DER KAISERLICHEN AKADEMIE DER WISSENSCHAFTEN. MEMOIRS OF THE IMPERIAL VIENNA ACADEMY OF SCIENCE. 4to. Vienna. Math. Nat. History Class. Vol. IX.; with Twenty-eight Plates. 1855.

ZOOLOGY.—(Hyrtl) Anatomy of *Chlamydophorus truncatus*, compared with that of *Dasypus gymnurus;* with six plates—p. 1-66. (Diesing) Sixteen genera of intestinal worms; with six plates—p. 169-185. The genera, illustrated from specimens in the Imperial Zoological Museum, are all Brazilian, except *Gyrocotyle* from Port Natal, and *Onchocerca* found in horses in Germany. PALEONTOLOGY. —(Reuss) On two Polyparia from the Hallstätt strata; with a plate—p. 167-169. (Hauer) The Cephalopods of the Hallstätt strata; with five plates—p. 141-166.

Part 2nd. Communications not by members.—(Suess) The Brachiopods of the Hallstätt strata; with two plates—p. 23-32. (Hörnes) The Gastropods and Acephala of the Hallstätt strata; with two plates—p. 33-56. (Peters) Chelonian remains from the tertiary beds of Austria; with six plates—p. 1-22.

SITZUNGSBERICHTE DER K. AK. D. WISS. PROCEEDINGS OF THE IMPERIAL VIENNA ACADEMY. Math. Nat. Hist. Class. 8vo. Vienna.

Vol. XVI.; with Thirty Plates. 1855.

ZOOLOGY AND PHYSIOLOGY.—(Czermak) Physiological studies, third section, sense of sight; with a plate—p. 563-600. (Stellwag) On defective power of accommodation of the eye; with two plates—p. 187-281. (Türck) On the conducting power of the spinal marrow in man; with a plate—p. 329-335. (Beigel) On morbid swelling and bursting of human hair—p. 612-616. (Wedl) Oology and embryology of intestinal worms; with two plates—p. 395-408. (Same) Helminthological notes; with three plates—p. 371-395. (Gredler) The Mollusca of the Tyrol; Report on, by Fitzinger—p. 287-292.

Botany.—(Fritsch) Observations on vegetation, made at Vienna and in other parts of Austria, during the year 1854—p. 294-328.

Geology and Paleontology.—(Schauroth) Geognosy of the district of Recoaro, province of Vicenza; with a map and three plates—p. 481-562. Many new fossils of the triassic formation are described and figured. (Stur) The deposits of Neogene (Miocene and Pliocene) Diluvium and Alluvium in the North-eastern Alps and the adjacent region—p. 477-539. (Peters) The Nerineæ of the Upper Jurassic formation in Austria; with four plates—p. 336-366. Of *Nerinea*, ten new species are described and figured, and one of *Cerithium*. (Sandberger) *Anoplotheca*, n. g. of Brachiopoda; with a plate—p. 5-8. (Hauer) Cephalopoda of the lias of the North-eastern Alps—p. 183-186. (Reuss) Paleontological miscellanies; notice—p. 144, 145. (Kenngott) Mineralogical notes, 17th sequel—p. 152-179. (Zepharovich) Jaulingite, a new fossil resin—p. 366-370.

Vol. XVII.; with Forty-three Plates and a Map. 1855.

Zoology and Physiology.—(Türck) On the diminished rate of pulsation in attacks of neuralgia—p. 317-330. (Wedl) Nervous system of the Nematodea; with a plate—p. 298-312. (Same) On the heart of *Menopon pallidum;* with a plate—p. 173-180. This parasite, common among the feathers of the barn-door fowl, shows a distinct organ placed in the penultimate segment of the body, behind the dorsal vessel, with an intervening bulb. The pulsations of this heart, in full vigour, were from 112 to 120 in the minute. The existence of a similar organ was ascertained in several other species of Mallophaga, but the transparency of the integument in *Menopon pallidum* affords the greatest facilities for the observation of it in vital action. (Hyrtl) Accessory branchial organs and intestine in the Clupeacei; extract—p. 163-165. (Kner) Contributions to Ichthyology; with six plates—p. 92-162. (Same) *Clarotes* new genus of Siluroidei; with a plate—p. 313-316. This fish was found alive deep in the sand in sinking a well near Khartoum in Sennaar. (Fitzinger) Report on the animals brought over alive by Consul-administrator Heuglin, from Egypt, Nubia, Abyssinia, &c., for the Imperial menagerie at Schönbrünn—p. 242-253. This important collection includes a young female of the rare *Bubalus caffer*, which has never before been seen alive in Europe, and is not even represented by a stuffed specimen in any museum. Also, a new species of sheep *Ovis syenitica*, and a handsome new antelope *Adenota megaceros*. Among the birds is the first living specimen ever brought to Europe of *Aquila rapax*. (Fitzinger) *Felis poliopardus*, n. sp.; with a plate—p. 295-298. Two skins of this new gray panther were purchased in London, and are supposed to have been brought from tropical W. Africa.

Botany.—(Lorenz) On the formation of the masses of *Aegagropila sauteri;* Report on, by Fenzl—p. 254-257.

Geology and Paleontology.—(Zeuschner) On the diffusion of the loam (Loess) in the Carpathian mountains—p. 288-295. (Heckel) On the fossil fishes of Austria; extract—p. 166-168. (Glocker) On the occurrence of Stilpnomelane—p. 401-410. (Filipuzzi) On Paraffin—p. 425-439; Analysis of coal from the triassic beds of Cludinico—p. 440-442. (Haidinger) Comparison of Augite and Amphibole as to their principal crystallographic and optical characters—p. 456-475. (Zeuschner) Geological notices, extract of letter—p. 475-478. (Osnaghi) Analysis of the mineral water of Galdhof in Moravia—p. 443-448. (Scherkel) Analysis of the mineral water of Schmekser Bad in the Carpathians—p. 449-455. (Wöhler) Fall of meteoric stone at Bremervoerde in Hanover, extract of letter—p. 56, 57; Analysis of the meteoric stone of Mezœ-Madaras in the Siebenburgen—p. 284-287. (Russegger) On the earthquake of the 30th September, 1855—p. 479, 480.

Zeitschrift fuer Wissenschaftliche Zoologie herausg: v. C. Th. v. Siebold u. A. Koelliker. Journal of scientific Zoology, edited by Siebold and Koelliker. 8vo. Leipzig. Vol. VI.; with Seventeen Plates. 1854-1855.

(Guanzati) Observations on a singular Infusory animalcule *(Amphileptus moniliger);* extract from a collection of essays on science and art: Milan: 1796—

p. 432–442. (Cienkowsky) Formation of cysts among the Infusoria; with two plates—p. 301–?05. (Gegenbaur) Organization of the Appendiculariæ; with a plate—406–427. (Leydig) Structure and systematic place of the Rotifera; with four plates—p. 1-120. (Aubert) Lymphatic and generative system, and development of *Aspidogaster conchicola*, compared with the other Trematodea; with two plates—349–376. (Moebius) *Chordodes pilosus*, one of the Gordiaceæ, out of Blabera gigantea; with a plate—p. 428–431. (Leuckart) *Cysticercus fasciolaris* produced from the eggs of *Taenia crassicollis*—p. 139. (Bischoff) Formation of the egg, and fecundation, in *Ascaris mystax*—p. 377–405. (Ecker) Electric nerves of Silurus—p. 140-142. (Hessling) On the odoriferous glands behind the horns of the chamois; with a plate—p. 264–271. (Lenk) Growth of the bone and enamel of the teeth; with figures—p. 121–134. (Fuchbeiner) Comparative examination of the structure of the vitreous body in Mammalia; extract, prize essay of University of Bern; with a plate—p. 330–348. (Koelliker) Growth of the lens of the eye—p. 142, 143. (Same) Experimental proof of the existence of a Dilatator pupillæ—p. 143, 144. (Bruck) On the regeneration of nerves that have been cut through—p. 135–138. (Meissner) On the tactory corpuscles—p. 296, 297. (Same) On the penetration of the spermatic element into the vitellus; with three plates—p. 209–264, 273–295. (Funke) Physiology of digestion; with a plate—p. 307–320. (Zenker) On the position of the chyle vessels in the mucous coat of the intestine—p. 321-329. (Bruck) On the conjunctive tissue—145–207. (Czermak) Microscopical examination of the tissues in the arm of a mummy from St. Michael's cave, Bourdeaux—p. 298-300.

FRANCE.

Revue et Magazin de Zoologie, pure et appliquee, Recueil mensuel, etc. Review and Magazine of Zoology, by Guérin-Méneville. 8vo. Paris.

Vol. VI., with fourteen Plates: 1854.

Original articles.—Paleontology.—(Michelin) Fossil Echinoderms; *Grasia* n. g.—p. 436–440. Radiata.—(Hollard) Zoological studies of g. *Actinia*—p. 225–229, 285–294, 623–634. (D'Orbigny) Examination of the genera of Echinodea—p. 16–28. Mollusca.—(Bourguignat) Conchological recreations; new species of shells; revision of g. *Pisidium*, &c.; with three plates—p. 14–16, 75–107, 658–676. (Drouet) *Anodontæ* of the Aube—p. 268–278, 320–333. (Hupé) *Blainvillia* n. g., type *Mactra vitrea* Chemn.; with a plate—p. 219–224. (Guérin-Meneville) New species of *Mactra* and *Terebra;* with a plate—p. 217–219. (Morelet) Helices of Spain and Morocco, collected by M. Tarnier—p. 614–623. Articulata.—(Guérin-M.) *Hypochoncha* n. g., type *Cancer sabulosus* Herbst; with a plate—p. 333–343. (Lucas) Insects of Crete; Coleoptera—p. 28–44; Orthoptera; with a plate—p. 165–170; Hemiptera—p. 278–285; Neuroptera and Hymenoptera—p. 487–491; Lepidoptera and Diptera—p. 562–571. (Chevrolat) Coleoptera of Syria; with three plates—p. 389–396, 432–437, 479–486. (Buquet) *Ancylocera terminata*, *foveicollis*, n. spp. of Longicornia—p. 343–345. (Peyron) *Cossyphus rugosulus* n. sp.—p. 224, 225. Vertebrata.—(Dumeril) Attempt at a classification of Reptiles in parallel series; *Pachycercus aculeatus* n. g., n. sp.; with a plate—p. 467–479, 544–562. (Müller) Claim of birds to protection—p. 697–699. (Jaubert) Letters on the Ornithology of the South of France—p. 158–164, 209–217, 258–267, 372–379. (Gerbe) Zoological miscellanies; birds occasional visitants of France; with a plate of *Querquedula formosa*—p. 3–14; Ornithology of the South of France—p. 349–351. (Lafresnaye) Ornithological miscellanies, *Picumnus squamulatus*, *Sasia lachrymosa*, n. spp.—p. 205–209. (Sinety, Comte de) Fauna of the department of Seine and Marne; birds—p. 193–205, 315–320, 381–389, 413–432, 458–467. (Bonaparte) Synopsis of the parrots—p. 145–158; Of the humming birds—p. 248–257. Of the birds of prey—p. 530–544. (Pucheran) New or little-known types in the Museum at Paris—p. 62–70. (Massena and Souanie) New species of Psittacidæ—p. 71–74. (Taragon) The specific rank of the greater sparrowhawk—p. 692–694. (Malherbe) *Indopicus carlotta*, n. sp. from Ceylon—p. 379–381. (Bourcier) *Hylocharis chlorocephalus*, n. sp. of humming bird—p. 457, 458. (Caire)

Change of plumage of Tetrao lagopus—p. 694–697. (Hardy) *Lestris spinicaudus* n. sp.—p. 657, 658. (Gerbe) *Arvicola incertus*, *ibericus*, described; with three plates—p. 359–372, 400–595, 613. (Sinety) Fauna of the dep. of Seine and Marne; Mammalia—p. 128–145. General Zoology.—(Guitton) Zoological classification, based upon the organs and functions of reproduction—p. 49–62, 113–127, 177–192, 241–248, 305–314, 353–359, 401–412, 449–457, 497–529, 577–595. The author pronounces ex cathedra for the spontaneous generation of the lower forms of animal life, with a tone of condescending wonder at the prejudices opposed to the universal admission of the principle, which may provoke a smile, when we remember the inherent difficulties of the investigation, whether of the organization or the functions in the more minute and obscure tribes, but he has brought neither argument nor evidence to bear upon that question. The Doctor Guitton seems more at home when the Vertebrata come under consideration. Here the physiological grounds of his classification realise a possibility already remotely suggested by comparative anatomy. Thus, the class resolves itself into three subclasses, the Amphibia receding one way to join the fishes, while the Reptiles pass over on the other side to the birds. The Mammalia alone are treated in some detail, and the families sketched in a rapid review, striking and comprehensive, if somewhat superficial in its generality. While the higher tribes, which most approach the human structure, are handled with peculiar predilection, that highest type is reserved; only a chapter on the structure of the arm, and the relation of this to the degree of intelligence, replacing the more usual topics of brain and scull in the materialistic view. The system is exhibited in dichotomous analysis, not as a convenient artifice, but as most conformable to nature; and a scheme of "inosculations" serves to account for the seeming anomaly of retrogressive transitions in a constantly ascending scale. We have given, on the opposite page, a specimen table exhibiting the grand sub-divisions of the animal kingdom according to Guitton's views. For some of the technical terms, see Burdach's Physiology.

Proceedings of Societies.—Zoological Society of Acclimatisation—p. 46–48. Paris Academy—p. 44, 45, 108–111, 171–174, 229–236, 295, 296, 346, 347, 397–399, 440–448, 491–495, 571–575, 634–652, 676–683. Extracts.—(Schultze) On Rhizopoda—p. 680. (Robert) A boring Echinoderm—p. 574. (Caillaud) Boring Mollusca—p. 397. (De Serres) On the same—p. 640. (Prevost) Boring Helices—p. 637. (Lacaze-Duthiers) Embryology of Mytilus—p. 440. (Ercolani) Development of Nematodea—p. 398. (Brullé) On Ligulæ—p. 636. (Küchenmeister) Development of Intestinal Worms—p. 683. (Bazin) Insects of the beet—p. 441; Disease of the walnut from insects—p. 571. (Guérin-M.) Diptera injurious to grain crops.—p. 573. (Vallot) On the same—p. 652. (Guérin-M.) Naturalisation of silkworm, *Bombyx cynthia*—p. 492, 573, 636, 679. (Montagne) On same—p. 676. (Milne Edwards) On same—p. 491. (Maréchal Vaillant) On same—p. 634. (Guérin-M.) Quantity of silk in cocoons—p. 231. (Same and Robert) Produce of silk in 1854—p. 444. (Cicconi) Eggs of silkworm—p. 677. (Thenard) Eumolpus vitis—p. 646. (Dumeril) General Herpetology—p. 493. (Bonaparte) Classification of pigeons—p. 645, 679. (Pucheran) Characteristics of the Australian Fauna—p. 574. (Dufossé) Hermaphroditism in the Vertebrata—p. 651. (Gros) Anomalous cases of reproduction—p. 639. (Marfelst and Moleschott) Passage of molecules into the vessels—p. 681. (Schiff) Arterial heart of rabbits—p. 572. (Moquin-Tandon) New-discovered pair of ganglions in Mollusca—p. 444. (Robin) *Perineura*, a constituent of the peripheric nervous system—p. 571. (St. Hilaire) The kingdoms of nature—pp. 645.

Obituary.—Strickland; Tyzenhauz—p. 48.

Reviews.—(Drouet) Letters on Conchology—p. 687–691. Laurent, Animalcules of vegetable infusions: Paris:—p. 656–678. Bourgignon, Classified Catalogue of land and fresh-water Mollusca, collected by M. De Saulcy in the course of his travels in the East—p. 236–238. Mortillet, Description of some new shells from America—p. 302, 303. Motschoulsky, Entomological studies: Helsingfors—p. 174–176. Jacquelin du Val and Migneaux, The Genera of European Coleoptera: Paris:—p. 575, 576. Fairmaire and Laboulbéne, Entomological Fauna of France; Coleoptera—p. 575, 576. Le Conte, Attempt to classify the Longicornes of N. America—p. 303, 304. Saussure, Monograph of the social

CLASSIFICATION OF ANIMALS.

Heterogeny ; spontaneous generation.
unlimited : INFUSORY ANIMALCULES.
limited : INTESTINAL WORMS.

Homogeny ; generation from like kind.
fissiparous,
aggregated : ZOOPHYTES.
free : ECHINODERMS.

sexual,
incomplete : hermaphroditism.
self-sufficient : MULTIVALVES, BIVALVES.
insufficient : UNIVALVES, CEPHALOPODS.

complete ; producing an egg.
egg incomplete ; undergoing metamorphose.
metamorphose multiple : ANNELIDS, CRUSTACEANS, ARACHNIDS.
metamorphose single : INSECTS.

egg complete : VERTEBRATES.
fecundated out of the parent,
after spawning : FISHES.
during spawning : BATRACHIANS.
fecundated within the parent.
embryo developed out of the parent,
by solar warmth : REPTILES.
by maternal incubation : BIRDS.

embryo developed within the parent : MAMMALS.
uterus multiple : *DIDELPHA.*
terrestrial. . *Monotrema*, *Marsupials*, *Rodents* (most).
aerial . . . . . *Lori*, *Squirrel.*

uterus single : *MONODELPHA or PLACENTARY.*
placenta multiple or diffuse : *HERBIVOROUS.*
unguligrade, { *Fissipeds* or *Ruminants.* / . . . *Solipeds.*
cutigrade, { hairy . . *Hog.* / naked, *Rhinoceros*, *Elephant*, *&c.*

placenta single :
mamillæ numerous, ventral : *CARNIVOROUS.*
digitigrade, { ungues retractile . . *Cat.* / ungues not retractile . *Hyena*, *Dog.*
plantigrade, { semiplantigrade . *Weasel*, *Racoon*, *&c.* / perfectly . . *Anteater*, *Bear.*

mamillæ a pair : *CHEIROZOA.*
quadrumane :
aquatic, { perfectly . . *Cetaceans.* / semiaquatic . . *Seals.*
aerial, { perfectly . . *Bats.* / semiaerial . . *Monkeys.*
bimane. . . . . *Mankind.*

wasps, Vespidæ: Paris: 1853—p. 45, 46, 239; Of the Masaridæ—p. 399, 400. Macquart, The insects of European trees—p. 347. Herklots, Carcinological note; extract from Scientific contributions of the Royal Zoological Society of Amsterdam —p. 691, 692. Fournet, Inquiry into the distribution and the modifications in the characters of some aquatic animals of the basin of the Rhone—p. 296-301. Nardo, Modern synonymy of the Abbé Cheregini's Description of the Crustacea, shells, and fishes of the lagunes of the gulf of Venice: Venice: 1847—p. 348. Müller, Birds of Africa: Stuttgart: 1853-4—p. 686, 687. Gervais, Natural History of Mammalia: Paris: 1854—p. 654, 655. Nardo, Existence of the organ of taste in some species of sharks: Venice:—p. 448; Observations of Comparative Anatomy on the intimate structure of the cartilages of the Chondropterygini: Venice: 1845—p. 448. St. Ange, Organs of reproduction in the five classes of Vertebrata; extract, Mem. Pres. Paris Academy—p. 652-654. Cornalia and Chiozza, Geology of Istria; extract, Mem. Lombard Institute—p. 302. Richard, Systematic Dictionary of Agriculture and Cattle: Paris:—p. 684, 685. Memoirs of the Society of Science, Agriculture, and the Arts, at Lille—p. 347, 348. Newman, Zoologist—p. 495, 496.

Vol. VII.; with Seventeen Plates. 1855.

Original Articles.—Mollusca.—(Bourguignat) Conchological recreations; with six plates—p. 23-34, 317-334, 556-573, 658-675. *Daudebardia*, n.g., and many new species. (Marcel de Serres) On the g. Dreissena—p. 574-579. (Crosse) *Bulimus Alexander*, n. sp.; with a plate—p. 34; Bulimi of N. Caledonia—p. 80-86. (Moquin-Tandon) On g. Bulimus—p. 238-245. (Hupé) *Cytherea loroisii*, n. sp.; with a plate—p. 468, 469. Articulata.—(Guérin-M.) *Pseudibacus*, n. g. of Crustacea (Scyllarina); with a plate—p. 137-141. (Ricard) On a silk-weaving Epeira, and the silkworm of Ficus elastica—p. 597-602. (Guérin-M.) On the silkworm of the oak, *Bombyx pernyi*; with a plate—p. 292-301; On the Tussah silkworm, *B. mylitta*—p. 398-400, 448; On a new silkworm, *B. bauhiniæ*—p. 543, 544; On Cetonia aurata as a specific for Hydrophobia—p. 342-344. (Chevrolat) New species of Longicorn beetles—p. 178-187, 513-523, 597-604. (Lucas) New Coléoptera of N. Africa—p. 290-292; Two new genera of Coleoptera from ant's nests, *Oochrotus* (Pycnidium) and *Merophysia* (allied to Holoparamecus); with a plate—p. 335-342. (Fairmaire) New European Coleoptera—p. 107, 108. (Rojas) New Coleoptera from Venezuela—p. 160. (Sella) *Carabus olympiæ*, n. sp., of Piedmont; with a plate—p. 469-471. (Truqui and Reiche) On *Cicindela ritchii (audouinii) peleterii*, &c.—p. 86-96, 156-159, 206-208. (Lucas) *Eremiaphila denticollis*, n. sp., of Algeria—p. 96-106, 395-398. (Barneville) On same—p. 442-448. (Poey) *Trigona rufipes*, characters of the sexes—p. 187-189. (Saussure) New species of Vespidæ—p. 371-375. (Coquerel) Singular parasites of a fig tree of Isle of Bourbon, *Apocrypta* and *Sycocrypta*, n. gg. (allied to Blastophaga, &c.); with a plate—p. 365-371, 422-427. Vertebrata.—(Dumeril) Notice of an unpublished work by Bibron on fishes, Plectognathi—p. 274-282. (Sinety) Fauna of the dep. of Seine and Marne; Reptiles and Batrachia—p. 129-137; Fishes—p. 231-238. (Bonaparte) Note on the Laridæ—p. 12-21; Ornithological corrections—p. 73-79. (Jaubert) Letters on the Ornithology of France; continued—p. 122-128, 167-174, 222-230, 308-316, 409-414. (Gerbe) Identity of *Calamoherpe palustris* Bechst. and *C. pratensis* Jaubert—p. 461-468. (Pucheran) On *Picus atrothorax* —p. 21, 22. (Lafresnaye) Birds of Chili and Columbia; with a plate—p. 59-63. (Sinety) Fauna of dep. of Seine and Marne, Birds—p. 129-137, 231-238. (Verreaux) On g. *Phœnicophaus*—p. 356, 357; Habits of exotic birds; with plates—p. 174-177, 217-222, 270-274, 353-355, 414-432; Birds of W. Africa, *Tricholæma*, n. g.; with a plate—p. 511-513, 555. (Müller) On the change of colour in birds—p. 113-121, 161-167. (Pucheran) Sketch of the Mammalogy of Africa—p. 209-217, 257-264, 401-409, 448-461, 497-502, 545-556; On the zoological equator—p. 305-308; Documents as to *Cervus philippinus*—p. 49-58; Diagnoses of new species of African Mammalia—p. 154, 155, 204-206; *Bdeogale nigripes*, n. sp.—p. 111; Notes on Mammalia—p. 392-394.

(Bureau) On the Classification of organized beings, and on Cetacea in particular —p. 3-12. (Guitton) Answer to Bureau—p. 264-270.

Proceedings of Societies.—Entomological Society of France—p. 602, 603. Zoological Society of Acclimatisation—p. 112. Paris Academy—p. 34-41, 108-111, 141-145, 189-192, 248-252, 301-303, 344-347, 375-383, 427-440, 472-488, 524-534, 579-594. Extracts.—(Gaudry) Fossiliferous beds of Pikermi in Attica —p. 528. (Firmâs) New species of fossil shells—p. 591. (Duvernoy) Age of the remains of Crocodilini found at Lecce, kingdom of Naples—p. 37. (Prevost) *Gastornis*, n. g., gigantic bird from the clay of Meudon, basin of Paris—p. 144. (Nodot) *Schistopleurum*, n. g., allied to *Glyptodon*—p. 427-431. (Focke) Structure of Naviculæ—p. 38-40. (Valenciennes) Boring Echinoderms—p. 524. (Davaine) Wheat-disease produced by *Anguillula*—p. 472-474. (De Serres) On g. *Dreyssena*—p. 144. (Lacaze-Duthiers) Reproductive organs of the oyster —p. 141. (Beneden) On the same—p. 142-144. (Moquin-Tandon) Spermatophora of terrestrial androgynous Gastropods—p. 527. (Hesse) *Praniza* a transitory stage of *Ancæus*—p. 534. (Lespés) Spermatophora of *Grylli*—p. 346. (Quatrefages) Report on the same—p. 434-436. (Courbon) Blistering beetles of Monte Video—p. 584-591. (Thenard) Method of destroying *Eumolpus vitis*—p. 35-37. (Guérin-M.) On the introduction of the Tussah silkworm—p. 376-378, 475-477. (Hardy) On the economic value of *Bombyx cynthia*—p. 345. (Cicconi) On muscardine—p. 529. (Bonaparte) Notice of Gray's genera of birds —p. 482-485; On the swallows that make edible nests—p. 579-584; Ornithological notes—p. 379, 485. (Lienard, Vinson) On the habits of the Aye-aye —p. 436-440, 478-481. (St. Hilaire) *Equus hemippus*, n. sp. in the menagerie of Natural History, Paris—p. 593. (Gratiolet) Brain of the elephant—p. 249. (Dareste) Brain of aquatic Mammalia—p. 432. (Pucheran) Brain and skeleton of aquatic Mammalia—p. 381; Relation between the nervous and muscular systems in man—p. 375; Fauna of Madagascar—p. 40. (De la Malle) Return of domesticated animals to a wild state—p. 436-438. (Dumas) Report of Commission on several memoirs concerning the functions of the liver—p. 302. (Figuier) Production of sugar in the animal economy—p. 476. (Poey) Electro-chemical agency for elimination of metals introduced medicinally into the human frame—p. 109.

Obituary.—Charpentier—p. 488-496.

Reviews.—Stanbury, Exploration and survey of the valley of the great salt lake of Utah: Philadelphia: 1852—p. 597. Perris, Excursion in the Landes; extract, Mem. Soc. Linn. Lyon: 1852—p. 303, 304. Stabile, Fossils of the triassic strata of the environs of the lake of Lugano; extract, Mem. N. Soc. Helv.: St. Gall: 1854—p. 536, 537. Nardo, Marine Fauna of the lagunes of Venice: 1847 —p. 385. Jay, Catalogue of shells arranged according to the Lamarckian system; 4th ed.: New York: 1852—p. 147. Rossmässler, Iconography of land and fresh water Mollusca—p. 153, 154. Albers, Mollusca of Madera and Porto Santo: Berlin: 1854—p. 388. Cotteau, Notes on land and fresh water Mollusca—p. 148. Drouet, List of land and fresh water Mollusca of Continental France—p. 391, 392. Millet, Mollusca of the dep. of Marne and Loire—p. 149-151. Cessac, Land and fresh water Mollusca of dep. of Creuse—p. 149. Panescorse, Mollusca of the dep. of Var—p. 148. Lea, Synopsis of Najades; 3rd ed.: Philadelphia: 1852—p. 386. Prime, Monograph of the spp. of Pisidium of U. S.: Cambridge, U. S.: 1852—p. 387. Gassiez, Species of Pisidium of Aquitaine—p. 389, 390. Cessac, Two new spp. of Pisidium, of dep. of Creuse, 1855—p. 390. Prime, Species of Cyclas of U. S.—p. 146, 147. Bourguignat, Monograph of French species of Sphaerium—p. 151-153. Sacc, Sketch of the history of the Purpura of the ancients; extract, Bull. Soc. Industr. Mulhouse: 1855—p. 537. De Saulcy, Note on Purpura: Metz: 1855—p. 537, 538. Toussenel, The world of birds; sentimental Ornithology: Paris: 1859—p. 41-47, 193-199. Cabanis, Journal of Ornithology: Cassel—p. 200. Machado, Theory of resemblances; extract—p. 541-543. Bulletin of the Physico-Mathematical class of the St. Petersburg Academy—p. 383-385. Bulletin of the Moscow Society of Naturalists—p. 440-442. Memoirs of the Society of Natural Science, Agriculture, and the Arts: Lille—p. 535, 536. Monthly Journal of the National Agricultural Society: Paris: 1854—p. 145, 146.

GREAT BRITAIN.

THE ANNALS AND MAGAZINE OF NATURAL HISTORY; including Zoology, Botany, and Geology. No. 97, January; No. 98, February; No. 99, March, 1856. 8vo. With Plates. London: Taylor & Francis. Price, 2s. 6d. each.

No. 97, January:—(H. T. Carter, Assistant-Surgeon, H.C.S., Bombay) On the conjugation of Cocconeis, Cymbella, and Amphora, together with some remarks on Amphiphora alata; with a plate. (A. Schmidt) Description of a new species of Clausilia, from the neighbourhood of Cheltenham. (Edward Blyth) Memoir on the Indian species of Shrews, with notes, by Robert F. Tomes. (Thomas Williams, M.D.) On the Mechanism of Aquatic Respiration and on the Structure of the Organs of Breathing in Invertebrate Animals. (James D. Dana) On the Origin of the Geographical distribution of Crustacea. (W. King, Professor Geology, Queen's College, Galway) On Anthracosia, a fossil genus of the family Unionidæ. (W. Clark) On the genus Assiminia. BIBLIOGRAPHICAL NOTICES.—Recherches sur les Crinoides du Terrain Carbonifère de la Belgique, par L. de Koninck, et H. le Hon. A Lecture on the Geological History of Newbury, Berks, by T. Rupert Jones, F.G.S. PROCEEDINGS OF LEARNED SOCIETIES.—Zoological Society, November 28, 1854. Botanical Society of Edinburgh, November 8, 1855. MISCELLANEOUS.—Observations on the Blistering Beetles of Montevideo; by M. A. Courbon. Unusual Dearth of Algæ in 1855; by Dr. Cocks. Observations on Echini Perforating the Granite of Brittany; by M. Valenciennes. New species of Mammals and Birds; Description of a new Bird from Guatemala, forming the Type of a new Genus; by John Gould, F.R.S. The late Mr. Newport. Meteorological Observations and Table for November, 1855.

No. 98, February:—(T. Rupert Jones, F.G.S.) Notes on the Palæozoic bivalved Entomostraca; with ten plates. (H. J. Carter, Assistant-Surgeon, H.C.S., Bombay) Further Observations on the Development of Gonidia (?) from the Cell-contents of the Characeæ, and on the Circulation of the Mucus substance of the cell; with two plates. (W. H. Benson) Amended description of the genus Scaphula. (Same) A fresh-water form of the Arcacea, with characters of a new species from Tenasserim, and a Description of Tanystoma tubiferum, a Burmese form, related to the genus Anostoma, of Lamarck. (William King, Professor of Geology, Queen's College, Galway) On Pleurodictyum problematicum; with a plate. (Thomas Williams, M.D., Lond.) On the Mechanism of Aquatic Respiration, and on the Structure of the Organs of Breathing in Invertebrate Animals. (J. Gwyn Jeffreys, F.R.S.) On the Marine Testacea of the Piedmontese Coast; with a plate. (G. R. Gray, F.L.S.) Notes on the Review of G. R. Gray's "Catalogue of the Genera and Sub-genera of Birds," in the December number of the "Annals." BIBLIOGRAPHICAL NOTICES.—Popular History of Palms and their Allies; by B. Seemann. Museum of Economic Botany; by Sir W. J. Hooker. Handbook to the Marine Aquarium; by P. H. Gosse. Popular Geography of Plants; by E. M. C., edited by Dr. Daubeny. The Flowering Plants and Ferns of Great Britain, &c., by J. G. Baker. PROCEEDINGS OF LEARNED SOCIETIES.—Zoological Society, February 27, 1855; Botanical Society of Edinburgh, December 13, 1855. MISCELLANEOUS.—Memorandum of the Animal of Scissurella crispata; by L. Barrett, F.G.S. Notes on the Marine Fauna of Weymouth; by William Thompson. Meteorological Observations and Table for December, 1855.

No. 99, March:—(Professor O. Heer) On the House Ant of Madeira; translated from the original by R. T. Lowe, A.M. (W. H. Benson) Characters of Seventeen New Forms of the Cyclostomacea from the British provinces of Burmah, collected by W. Theobald, jun. (John Blackwall, F.L.S.) Descriptions of Three newly discovered Species of Araneidea. (C. C. Babington, A.M., F.R.S.) On some Species of Epilobium. (Thos. Williams, M.D., London) On the Mechanism of Aquatic Respiration; and on the structure of the Organs of Breathing in invertebrate animals; with two plates. (William King, Professor of Geology, Queen's College, Galway) Notes on Permian Fossils; Palliobranchiata. (William Clark) On Scissurella Crispata. (J. Gwyn Jeffreys, F.R.S.) Further Notices of Piedmontese Mollusca. BIBLIOGRAPHICAL NOTICES.—Natural History of the Tineina; by H. T. Stainton. Sylloge Generum Specierumque Cryptogamicarum, &c., &c.; by

C. Montague, D.M. PROCEEDINGS OF LEARNED SOCIETIES.—Zoological Society, March 13, 1855; Botanical Society of Edinburgh, January 10, 1856. MISCELLANEOUS.—On the Earliest Stages in the Development of Pelagia Noctiluca; by Dr. A. Krohn. Description of a New Species of Swift. Meteorological Observations, and Table for January, 1856.

EDINBURGH NEW PHILOSOPHICAL JOURNAL; exhibiting a View of the Progressive Discoveries and Improvements in the Sciences and Arts. Edited by Thomas Anderson, M.D., Sir W. Jardine, Bart., and T. H. Balfour, M.D. No. 5. January, 1856: to be continued quarterly. 8vo. Price 6s., with eight Plates.

(J. W. Dawson, F.G.S.) Notice of the species of Meriones and Arvicola found in Nova Scotia (plate 1). (Sir Thomas Tancred, Bart.) Notes on the Natural History of the province of Canterbury, in the middle island of New Zealand. Astronomical contradictions and geological inferences respecting a plurality of Worlds. (David Forbes, F.G.S.) On the chemical composition of some Norwegian minerals. (G. J. Allman, M.D., F.R.S.) Introductory Lecture delivered to the Students of the Natural History class, in the University of Edinburgh, at the opening of the Winter Session of 1855. It is a hard task to have to write an introductory lecture, dealing as it does with generalities already grown old; yet it is expected to contain perhaps more of novelty than any other of the course. In the present instance, Professor Allman, departing from the ways of old routine, points out to the students of Edinburgh the nature and bearings of the subjects with which his course was to be occupied, and instructs them in the plan which it was his intention to pursue. This, in our unprejudiced opinion, he has succeeded in doing in a manner becoming the Professor of the first chair of Natural History, perhaps, in the world. In a style peculiarly his own, we are led to see the connected links of Zoology with Comparative Anatomy, and of the early mornings of creation, with those of yesterday. With but one exception, the English is vigorous, and yet sparkles with the poetic fancies that are so characteristic of our countrymen; and we confess that on our perusal of this lecture, we felt somewhat of a pang of sorrow that we should never more hear our old Professor lecturing in our classic walls. (David Forbes, F.G.S.) On the relations of the silurian and metamorphic rocks of the south of Norway (plates 2 and 3). (Sir W. Jardine, Bart.) Contributions to ornithology. No. 2 (plate 4). (J. S. Cobbold, M.D.) On a remarkable pouched condition of the Glandulæ Peyerianæ, in the Giraffe (plate 5). (Andrew Murray, W.S.) Notice of the Leaf-insect (Phyllium Scythe) lately bred in the Royal Botanic Gardens of Edinburgh, with remarks on its growth and metamorphoses (plates 6, 7, and 8). (Henry C. Sorby, F.G.S.) On the Physical Geography of the Old Red Sandstone Sea of the central district of Scotland. (G. Dickie, M.D., Prof. Nat. Hist., Queen's College, Belfast) Traces of Unity of form in the individual bones of the Skeleton. (John Fleming, M.D.) On the different branches of Natural History, the chairs which have been instituted for their illustration, and the manner in which they should be subordinated. (W. J. Henwood, F.R.S.) On the metalliferous deposits of Kumaon and Gurhwal in North Western India. Reviews. Correspondence. Proceedings of Societies. Scientific Intelligence.

QUARTERLY JOURNAL OF MICROSCOPICAL SCIENCE. No. 14, January, 1856. 8vo. Price 4s. With Woodcuts and Lithographic Illustrations. London: John Churchill.

No. 14, January, 1856:—Transactions of the Microscopical Society of London. (F. H. Wenham) On the Formation and Development of the Vegetable Cell; with a plate. Original communications on Certain Conditions of the Dental Tissues; by John Tomes, F.R.S.; with a plate. On the Filamentous, Long-horned Diatomaceæ, with a description of two new species; by Thomas Brightwell, F.L.S.; with a plate. Observations on the Practical Application of the Microscope; by J. Hepworth; with a plate on the Mandibles of the Acarus Scabiei. On a case of green pigment degeneration of the Heart; by Dr. Thiedman; with a plate. On the Actinophrys Sol.; by T. Weston, H.E.T.C. Translations.—On the Impregnation and Germination of Algæ; by M. Pringsheim. On the Course of Amyloid

Degeneration; by Rudolph Virchow. Reviews.—Researches on the Structure and Formation of the Vegetable Cell; by Dr. Pringsheim. Manual of Marine Zoology and Handbook to the Marine Aquarium; by P. H. Gosse. General Outline of the Animal Kingdom; by T. Rymer Jones. Notes and Correspondence.—Finders vindicators. On Micrometers applied to Microscopes. Cilia in Unicellular Plants. Remarks on Mr. Wenham's Paper on Aperture of Object-glasses. Mohl on Chlorophyll. On the Microscopical Structure of the Victoria regia. The Stomachs of the Polygastrica. Proceedings of Societies. Zoophytology.

THE ZOOLOGIST. No. 159, January; No. 160, February; No. 161, March, 1856. 8vo. London: John Van Voorst. Price, 1s. each.

No. 159, January:—NOTICES OF NEW BOOKS.—The Natural History of the Tineina, Vol. I.; by H. T. Stainton. The Microscope and its Application to Vegetable Anatomy; by Dr. H. Schacht. A Handbook to the Marine Aquarium; by P. H. Gosse. Contributions to the Natural History of Labuan; by J. Motley and L. L. Dillwyn, Part I. Natural History Review, No. VIII. Quarterly Journal of Microscopical Science, No. XIII. Annals and Magazine of Natural History, No. XCV. (Robert F. Tomes) Removal of Vespertilio emarginatus from the list of British Bats, and addition of V. dasycnemus to it. (Hesperus) A glance over the Cliffs of Mohir (Co. Clare), Ireland. (Thomas Lister) Notices of rarer Birds about Barnsley. On the habits of Palæorhis malaccensis and of Dicæum croceoventer in confinement, from the Natural History of Labuan. (George Guyon) Late stay of Swallows in 1855. (H. Stevenson) Bohemian Waxwing in Norfolk. (P. L. Sclater) The Palombière of Bagneres de Bigorre. On the Habits of Megapodius Cumingii, from Natural History of Labuan. (E. V. Harcourt) Late stay of Swallows and Martins in 1855. (E. H. Rodd) Notes on the same. (H. Stevenson) Occurrence of the Sea Eagle in Norfolk, Note on the Hawfinch breeding, and on the Occurrence of the Shore Lark and Iceland Gull in Norfolk. (J. Gatcombe) Occurrence of the Great Plover and Spotted Crake in Devonshire. (E. H. Rodd) Occurrence of the Velvet Scoter at the Land's End, and on a remarkable flight of Woodcocks. (Edward Newman) Occurrence of the Stilt Plover in Sussex. Question respecting the American Scaup, said to have been taken at Scarborough. (A. H. Lloyd) Fresh water fish in Confinement. (A. G. More) The great Sea Serpent. (Robert Warrington) Observations on the Habits of the Stickleback. (C. R. Bree) The Gonepteryx Rhamni question. (J. J. Reeve) Capture of Colias Hyale and C. edusa in Sussex, of Argynnis Lathonia in Norfolk, and of Callimorpha Hera in Sussex. (Edward Newman) Mr. Scott's note on Argynnis Lathonia. (H. Harpur Crewe) Double-broodedness of Notodonta camelina and Clostera reclusa. (George Wailes) Spiræa ulmaria, a food-plant of Lampronia prælatella. Occurrence of Plutella annulatella and of Peronea caledoniana near Newcastle. Note on Tinea ochraceesla. (H. H. Higgins) Occurrence of Anthrax Hottentota in Lancashire. (H. T. Stainton) Duplicate Micro-Lepidoptera. (J. W. Douglas) Duplicates of Micro-Lepidoptera. (R. Hislop) Localities of Elaphrus lapponicus and Agabus congener. (Edward Newman) Actinia swimming in an inverted position. (George Guyon) Observations on a fresh-water Aquarium. These are most interesting notes; and we are glad to find that the study of fresh-water animals is likely to become as popular as those of the marine. Many new subjects will be found to present themselves for our investigation. (Robert Warrington) On the Injurious Effects of an excess or want of heat or light on the Aquarium. Proceedings of Societies.—Entomological Society, November 5, 1855, December 3, 1855.

No. 160, February:—Society of British Entomologists, November 2; 6, 1855, Cornwall Natural History and Antiquarian Society, November, 1855. Notices of New Books.—General Outline of the Animal Kingdom; by T. Rymer Jones, F.R.S. The Entomologist's Annual for 1856; Annals and Magazine of Natural History, No. 96, 97; Quarterly Journal of Microscopical Science, No. XIV. (R. Knox, M.D., F.R.S.E.) The Present Position of the Salmon Question, considered physiologically. To those who are not tired with this vexed question, these light pages by Dr. Knox will give a fair summary of the facts known about the

salmon. Anecdote of a Fox, from the *Sussex Express*. (W. T. Bree) Deer Feeding on Horse-Chesnuts. (J. J. Briggs) Deer Feeding on Horse-Chesnuts, and on the Piscivorous Propensities of the Water Campagnol. (Edward Newman) Black Hawfinch. (J. C. Dale) Popular Fallacies about Birds. (H. W. Hadfield) Late Stay of the Swallow Tribe. The exact dates from Captain Hadfield's note-book are here given. The last martins were seen December 2, at 4 o'clock, p.m.; the last swallow November 24, 1855. (W. W. Wingfield) Anecdote of the Turtle Dove. (W. Yarrell) Recent Occurrence of the Great Bustard in Berkshire. (G. Grantham) Occurrence of the Bittern near Lewes. (W. H. Slaney) Savage Conduct of a Tame Drake. (S. F. Baird) The Sea Snake Story a fiction (Edward Newman) The supposed new Flounder. (C. Spence Bate) Antennæ of the Prawn. (S. Carter) Capture of Lepidoptera in North Wales. (A. Rains) Singular swarm of Vanessa Urticæ in December. (John Scott) Remarks on Mr. Newman's note relating to Argynnis Lathonia.

No. 161, March:—(Geo. B. Wollaston) Capture of Parnassius Apollo at Dover; also, Argynnis Lathonia, Catocala Fraxini, near Chiselhurst, in Kent. (R. S. Edleston) Trochilium Chrysidiformis. (Alfred Walker) Occurrence of Luperina abjecta in Flintshire. (H. I. Gore) Capture of Lepidoptera near Horsham. (Thos. Chapman) The Larva of Carpocapsa pomonana feeding on the Fig. (H. T. Stainton) Observations on Micro-Lepidoptera. (John Scott) Occurrence of Tinea imella, T. pallescentella, and of Nemophora pilella, at Stockton. (T. J. Bold) Note on Antherophagus Nigricornis and Bombus Sylvarum. Question as to the Eggs of Agabus; Capture of Agabus dispar.; Localities for the rare Hydroporus Latus, *Steph.* (Edward Newman) Occurrence of Agabus Pulchellus in Scotland. (Rev. Hamlet Clark, A.M.) Synonymic List of the British Species of Philhydrida, with Notices of Localities, &c. This paper is an introduction to the synonymic list, which we hope may speedily follow. We hope soon to see the tangled synonyms of our British Coleoptera reduced to order, and catalogues of them published for the use of entomologists. (J. C. Dale) Humming in the Air; Notes on the British Museum lists of British Insects. (William Atkinson) Excrescences on the Leaves of Willows. (George Guyon) Wasp in January; Effects of light and heat on Actiniæ. (H. T. Stainton) Entomological Botany; with more especial reference to the plants frequented by the Tineina. Proceedings of Natural History Collectors in Foreign Countries; W. H. W. Bates. Proceedings of Societies.—Linnean Society, January 15, February 5, February 19; Entomological Society, January 7; Anniversary Meeting, January 26; February 4, 1856.

THE NATURALIST: a popular monthly Magazine, with numerous Engravings; conducted by Rev. F. O. Morris, B.A. No. 59, January. No. 60, February. No. 61, March, 1856. 8vo. Price 6d. each. London: Messrs. Groombridge.

No. 59, January:—(E. W.) Geological Excursion. (Henry Smurthwaite) Remarks on the Collecting of Oological Specimens. (J. M'Intosh) The Common Toad; with engraving. Occasional Notes.—(M. Westcott) The Adventures of a Cat and Kitten; the Bittern; Havoc among Sparrows; the Otter; the Primrose; the Contrast; Butterflies; Sand Martins, &c. (O. S. Round) Stray Notes. Systema Naturæ; by the Editor. Miscellaneous Notices.—Oared Shrew; an Extraordinary Hawk; Occurrence of the Rose-coloured Pastor; Green Sandpiper; Red Admirals; Curious Hatch of a Hen; Rose-coloured Pastor; Mountain Finch; Long-tailed Tits; Partridges; Rock Thrush; Ring Ouzel; Notes on Fish and Wild-fowl. London Entomological Meeting. To the Subscribers and Readers of "The Naturalist." The Retrospect.—Bill of the Hawk. Moth Mixture—Quantity on each tree; situation for sugaring; best nights.

No. 60, February.—(E. W.) Geological Excursion. (J. M'Intosh) Injurious Insects; the Common Wasp. (O. S. Round) The Effects of Spring. (J. S. Walker) Down the River. (Major Gifford) Arrival of the Hirundines, &c., at Minehead, Somerset, in 1855. (Major Gifford) Extracts from my Note-book. (John H. Davies) New Yorkshire Stations for Rare Mosses. Systema Naturæ; by the Editor. (J. H. Davies) Three Days in Caernarvonshire. Miscellaneous

Notices.—The Domestic Cat; Lateness of the Chimney Swallow; a Real Rara Avis; the Mealy Redpole; Green Sandpiper; Oyster-catcher; Additional Note on the Starling in the "Birds of Terrick;" Short Sun Fish; Music hath charms for the Butterfly; Plantago lanceolata; Boletus squamosus; Occurrence of Acherontia atropos at Southport; Vanessa Atalanta; Relaxing of Insects; Winter Birds. Reviewing. Reviews.—The Flowering Plants and Ferns of Great Britain; an attempt to classify them according to their Geognostic Relations. By John Gilbert Baker. London: W. and F. G. Cash. The Entomologist's Annual for 1856. London: Van Voorst. Proceedings of Societies.—Aberdeenshire Natural History Association. The Querist.—Extermination of Sparrows.

No. 61, March:—(E. K. B.) The Common Squirrel. (J. M'Intosh) Notes on the Cuckoo. (Rev. R. P. Alington) Odds and Ends. (Rev. F. O. Morris) A Chapter on Instinct. The proposed increase of the Size and Price of "The Naturalist." (J. H. Davies) Three Days in Caernarvonshire. (Rev F. O. Morris) Systema Naturæ. Miscellaneous Notices.—To the Editor of "The Naturalist;" Occurrence of the Mealy Redpole at Hammersmith; the Lime Tree. The Retrospect.—The Hawk. The Querist.—Breeding and Rearing of Foreign and English Birds in confinement; Spider and Fly; Answer to F. G. Bonney's Query in the December Number.

Hooker's Journal of Botany, and Kew Garden Miscellany. No. 84, January. No. 85, February. No. 86, March, 1856. 8vo. London: Lovell Reeve. With a Plate, price 2s. each.

No. 84, January:—(Dr. Ferdinand Mueller) Definitions of Rare, or hitherto undescribed Australian Plants, chiefly collected within the boundaries of the Colony of Victoria. Dr. Mueller and the North Australian Exploring Expedition. We have here some extracts of letters from this indefatigable botanist, written just as he was setting out on this expedition. We may hope great things from the investigation of such a man. Catalogue of Mr. Geyer's Collection of Plants gathered in the Upper Missouri, the Oregon Territory, and the intervening portion of the Rocky Mountains; by Sir W. J. Hooker. On Chamælaucieæ; by Dr. Meisner. Uses of Scirpus Lacustris (bullrush) in South America. Botanical Information.—Extracts of recent Letters from Dr. Harvey, dated Sydney, May and June, 1855. Vegetable Fibres—Botanical Garden, Peradenia, Ceylon. Note on Asplenium Fontanum; by Mr. Thos. Moore. Dr. Asa Gray on the Development of the Seed-coats of Magnoliaceæ. Agave Americana in Devonshire. Flora Indiæ Batavæ. Ferns of Great Britain and Ireland. Nature Printing; Parts VIII. and IX. Botany of the Antarctic Voyage, III. Flora of Tasmania; Part I. Xenia Orchidacea.

Journal of the Proceedings of the Linnean Society. 8vo. London: Longman, Brown and Co., and Williams and Norgate.

Vol. I. No. 1. March, 1856.

Zoology.—(Ralph) On the Katepo, a supposed poisonous spider of New Zealand, extract of a letter—p. 1, 2. (Bell) On the habits of Argyroneta aquatica—p. 2–4. (Walker) Catalogue of the Diptera collected at Singapore and Malacca by Mr. A. R. Wallace; with descriptions of new species, and two plates—p. 4-39. Out of the total list of one hundred and twenty-three species, ninety are described as new, and eleven new genera. (Newman) On a supposed species of Pelopæus—p. 39. (Newport) On the Natural History of the glow-worm, Lampyris noctiluca—p. 60. These observations of the eminent anatomist, whose decease science deplores, were left incomplete, but appeared too important to be lost. They have accordingly been prepared for publication by Professor Ellis, of University College, London.

Botany.—(Bunbury) On the Botany of Madeira and Teneriffe—p. 1-35 (Meisner) New species of Chamælaucieæ—p. 35-48. (Kippist) Notice of two apparently undescribed species of Genetyllis from S. W. Australia—p. 48.

Proceedings, etc.—pp. 16.

This journal is intended to appear quarterly. The zoological and botanica portions have their several paging, and either can be had separately.

No. 85, February:—(Dr. F. Mueller) Definitions of rare, or hitherto undescribed Australian Plants. Dr. Mueller and the North Australian Exploring Expedition. (H. Cleghorn, M.D.) Note on the Sand-binding Plants of the Madras Beach. These plants are seven in number—viz., Spinifex Squarrosus, Ipomœa Pescapræ, Hydrophylax maritima, Microrhynchus sarmentosus, Papalia orbiculata, Pandanus odoratissimus, Ehretia arenaria. Notice of De Candolle's Geographie Botanique Raisonnée.

No. 86, March:—(Dr. F. Mueller) Definitions of rare, or hitherto undescribed Australian Plants, and on Duttonia, a new genus of Myoporineæ from South Australia. (Sir W. J. Hooker) On the Balsam-bog. This plant, the Bolax glebaria of Commerson, has at length been obtained for the Museum at Kew. The specimen, which was brought over by George Rennie, Esq., from the Falkland Isles, weighed 303 lbs.; it yields a moderately soft gum resin, becoming fluid with heat, and very adhesive, which is used as an application to cuts and other lesions with apparent effect. Notices of New Books, &c.

AMERICA.

Smithsonian Contributions to Knowledge. 4to. Washington. Vol. VII. 1855.

(Bailey) Notes on new species and localities of Microscopic Organisms; with a plate—pp. 16. (Leidey) Memoir on the extinct Sloth tribe of North America; with sixteen plates—pp. 70. The following species are illustrated; *Megalonyx jeffersonii, dissimilis* Leidy; *Ereptodon priscus* Leidy; *Mylodon harlani* Owen, (and by comparison the South American *M. darwynii, robustus*); *Megatherium mirabile* Leidy, n. sp.; *Gnathopsis oweni* Leidy.

The American Journal of Science and Arts; conducted by Professors Silliman and James D. Dana, &c. Second Series. 8vo. New York. 1856.

Zoology.—(Conrad) *Unio diversus*, n. sp.—p. 172. (Nicklès) On the presence of Vivianite in human bones—p. 402. Botany.—(Braun) The vegetable Individual, in its relation to Species; continued—p. 58–79. (Bailey) On the non-existence of polarizing Silica in the Organic Kingdoms—p. 357, 358. Geology, Paleontology, etc.—(Coan) Kilauea volcano—p. 100-102. (Same) On the recent eruption of Mauna Loa—p. 237-241. (Dana) Supplement to his Mineralogy; Number II.—p. 193-212. (Same) On volcanic action at Mauna Loa—p. 241-244 (Hayes) On a specimen of native Iron from Liberia, Africa—p. 153–157. (Same) On Serpentine rock—p. 382–385. (Hitchcock) On a fossil fish of a new family, and new fossil footmarks—p. 96–100. (Isbister) Geology of the Hudson's Bay Territories, and of portions of the Arctic and N. W. Regions of N. America—p. 313–338. (Murchison) Occurrence of fragments of Firwood in the islands of the Arctic Archipelago; with remarks on the Rock specimens brought from that Region; Extract from Journal of Geol. Soc. of London—p. 377–382. (Rogers) Origin and accumulation of the Protocarbonate of Iron in Coal-measures—p. 339–343. (Sedgwick and McCoy) Subdivisions of the Palæozoic strata of G. Britain; Extract—p. 343–356. (Shepard) New localities of Meteoric iron—p. 213–216. Microscopical and Optical Science, etc. (Bailey) New method of disintegrating masses of fossil Diatomaceæ—p. 356. (Same) Remarks on Mr. Wenham's paper on the Aperture of Object-glasses—p. 105–106. (Johnson) Indicator stage for Microscopes—p. 386–388. (Rogers) On binocular vision; continued and concluded—p. 80–95, 173–189. (Rood) Adaptations of the Compound Microscope—p. 106–111. (Wenham) On the Aperture of Object-glasses; Extract from Quarterly Journal of Microscopical Science, London—p. 103–104. Correspondence—p. 117–124, 254–261, 403–408. Scientific Intelligence—p. 125–152, 262–304, 409–451.

The Canadian Journal. New Series. 8vo. Toronto.—No. 1, January; No. 2, March, 1856, contain the following articles on Natural History. (Hodgins) The Proteus of the lakes—p. 19-22. According to the Report of committee of examination, the species is *Menobranchus lateralis*—p. 23. (Bovell) Notes on some points

in the economy of the Leech ; with a plate—p. 27-33. (Couper) Coleoptera collected in Canada, additions to previous list ; none of them new species—p. 33-39.

RUSSIA.

Bulletin de la Societe Imp. des Naturalistes de Moscow. Bulletin of the Moscow Society of Naturalists. Vol. XXVIII. 8vo. Moscow. 1855.

No. 1. (Chaudoir) On the family Carabici—p. 1-110. (Radde) Animal life about the Putrid Sea—p. 150-184. (Kiprijanoff) A few words on the Vertebrata which are found in the inundated grounds of the basins of the Dnieper and Wolga, between Orel and Charkoff; with figures—p. 185-205. (Romanowsky) Geognostical description of the banks of the river Nara; with a chart —p. 206-217. (Eichwald) On the genera *Cryptonymus* and *Zethus*—p. 218-240.

No. II. (Hermann) Examination of Ilmenium, Niobium, and Tantalium —p. 241-290. (Turczaninow) Description of the plants that grow wild in the countries on this and the other side of Lake Baikal, and in Dahuria ; continued —p. 291-353. (Kiprijanoff) Second notice of *Hybodus Eichwaldii ;* with a plate—p. 392-400 (Lindenmayer) Euboea, a Natural History Sketch—p. 401-451. (Weiss) Results of a microscopical examination of the "Black Earth," Tscherno-Sjom—p. 452-459. (Becker) Some Natural History notices of the year 1854—p. 460-482. Proceedings of the Society, etc.

Archiv fuer die Naturkunde Liv-, Esth-, und Kurlands. Archives of Natural Science for Livonia, Esthonia, and Courland ; published by the Dorpat Society of Naturalists. 8vo. Dorpat.

First Series, Mineralogy, Chemistry, Physics, and Geography. Vol. I. No. 1. 1854. (Schrenk) Sketch of the strata of the Upper Silurian system of Livonia and Esthonia, and of their insular groups in particular—p. 1-112. (Goebel) Medicinal sea mud of the coasts of the isle of Oesel—p. 113-238. (Same) On the determining causes of the colour of the gray and yellow Dolomites and Limestones of the Upper Silurian rocks of Livonia and Esthonia— p. 239-292.

Second Series, Biology. Vol. II. No. 1. 1853. (Schmidt) Flora of the isle of Moon, with an orographical geognostical sketch of the soil—p. 1-62. No. 2. 1855. (Girgensohn) Synopsis of the Musci Frondosi and Hepatici of the Baltic provinces—p. 63-74. (Wahl) The freshwater Bivalves of Livonia— p. 75-148.

GERMANY.

Acta nova Academiæ C. L. C. Naturæ Curiosorum. Transactions (New) of the Imperial Academy of Naturalists. 4to. Bonn.

Vol. XXIV., Supplement. 1854.

(Wagener) The Development of the Cestodea, from original Observations. An anatomical Introduction, followed by details concerning one hundred and seventy-four species of this group ; with twenty-two plates—pp. 91.

Vol. XXV. Part 1. 1855.

(Gomp-Besanez) Chemical examination of the mineral Springs of Sleben in Langenau, Bavarian Vogtland—p. 1-40. (Goeppert) Contributions to the History of the Dracaeneæ ; with three plates—p. 41–59. (Jessen) On the duration of the life of plants ; Prize essay— 61-248. (Itzigsohn) Biological sketches of *Hapalosiphon braunii*, fam. Nostochaceæ ; with five plates—p. 249–297. (Cohn) *Empusa muscæ*, and the malady of the house-fly. A contribution to the History of the Epidemics characterized by the presence of parasitic fungi ; with three plates—p. 299–360. (Guembel) The Thallophysis in parallelism with the Pollen-granule ; with two plates—p. 361–448. Commencing with the examination of the "stomata" in the capsules of mosses, the author investigates the nature of the so-called organs of plants in general—whether pores or cells ; and decides for the latter view. In consequence, he proposes to substitute for Stoma the term Thallophysis (Spreite-korn,) on account of their function as propagative centres to multiply the cells of the epidermis. The results may be thus summed up. The organs

in question are like spores scattered over a surface, which shoot forth sacs to contribute in common to the formation of the epidermis. The thallophyse is no pore-cell, no fissure or respiratory orifice, but a centre for the increase of the cells of the epidermis, having a central or heart-cell, whose contents are found in a state of more or less granular coagulation, or of solution. This central cell may be developed in different degrees, or remain undeveloped, or disappear. In the latter case the two including cells become true epidermis cells. Respiration in plants takes place by Endosmose and Exosmose of the cells of the epidermis. "Stomata" are found in surfaces not in contact with the air; for example, on the inner walls of the berry of *Atropa belladonna* in its younger stage. Some remarks are added on the nature of the grape disease. It is shown that the Carposma, or organism proceeding from the pollen-granule, may degenerate into mould. The disease of the grape is concluded to be a consequence of the luxuriant development of the Carposma of the grape-pollen upon the green organs of the plant. The *Oidium tuckeri*, then, is no self-propagating fungus, but a fungus-like development of the Carposma. Heavy rains, by washing off the deposit of pollen, prove a natural remedy. (Mayer) On the structure of the Integument of the Cetacea; with three plates—p. 449-475. (Beigel) Investigation of the Urine, and the quantity of Urea excreted by healthy subjects, under ordinary, spare, or generous diet, and under the action of antiphlogistic medicines; a Prize essay—p. 477-528.

Physikalische Abhandlungen der Koeniglichen Akademie der Wissenschaften zu Berlin. Transactions of the Royal Berlin Academy of Science. Section of Physical Sciences. For the year 1854. 4to. Berlin. 1855.

(Mueller) On the genera of the Echinoid larvæ. Seventh essay on the metamorphosis of the Echinoderma; with nine plates—p. 1-55. (Beyrich) On the stratification of the Cretaceous formation in the Silesian mountains; with a chart —p. 57-80. (Lichtenstein and Peters) On some remarkable new Mammalia of the Royal Zoological Museum; with three plates—p. 61–100. (Peters) On the Echinoids observed on the seacoasts of Mozambique, and the group *Diadema* in particular; with a plate—p. 101-119. (Klotssch) The genera and species of Begoniaceæ; with twelve plates—p. 121-255.

Zeitschrift fuer Wissenschaft liche Zoologie u. s. w. Journal of Scientific Zoology, by Siebold and Koelliker. 8vo. Leipzig. Vol. VII.; with twenty-four plates. 1855, 1856.

Parts I. and II. May 20th, 1855.

(Meissner) Contributions to the Anatomy and Physiology of the Gordiacei; with seven plates—p. 1-144. (Lent) Contributions to the history of the regeneration of severed nerves; with a plate—p. 145–153. (Claudius) Remarks on the structure of the spiral ridge of Helices; with a plate—p. 154-161. (Vogt) Contribution to the Embryology of one of the Cephalophora, *Pneumodermon?*—more probably a Gastropod, perhaps *Gasteropteron*, according to Gegenbaur in a note; with a plate—p. 162-169. Short Communications and Correspondence—p. 170-184. (Filippi) On the swimming-bladder of *Oligopus ater* Risso. (Bruch) On the Micropyle of fishes' eggs; with a plate. (Agassiz) On the Angiology of the Lymphatic system in Mollusca. (Koelliker) On the action of caustic alkalies on the movements of the spermatic filaments. (Same) On the occurrence of corpuscles of lymph in the origin of the Lymphatic vessels. (Same) On the action of a concentrated solution of Urea on the blood-cells.

Part III. Sept. 29th, 1855.

(Czermak) On the nature of the system of curves, detected by Dr. Thomas, on polished sections of the optic lens; with a plate—p. 185–192. (Vogt) A few words on the Systematic position of the Rotifera; with a plate—p. 201–272. Refuting by various arguments the opinion of Burmeister, adopted by Leydig in his essay in the preceding volume, which associates them with the Crustacea, and maintaining their nearer agreement with the worms. (Koelliker) Physiological studies of the seminal fluid; with a plate—p. 201–274. (Hensche) On the

glands and smooth muscles in the epidermis of *Rana temporaria*—p. 273-280. (Gegenbaur) On the cycle of development of *Doliolum*, and remarks on its larvæ; with three plates—p. 283-314. (Funke) Contributions to the physiology of Digestion; with a plate—p. 315–327. Short Communications and Correspondence—p. 328-344. (Vogt) On the mucous canals of fishes. (Bilharz) On *Pentastomum constrictum;* with figures. (Bischoff) Estimate of the quantity of blood in the body of a subject decapitated. The result in this instance, obtained by ablution, and measurement of the intensity of red colour of the product, gives an average much lower than most former estimates, viz., little more than one-thirteenth of the entire weight of the body, or 9½ pounds in this case. (Schiff) On degeneration and regeneration of nerves; with reference in particular to the communications of Lent. (Weisse) Critique of his own writings on Infusoria. (Czermak) An observation on the physiology of the nerves, in *Triton cristatus;* Catalepsy produced by pressure of the extremities.

Part IV. December 31st, 1855.

(Aubert) Contribution to the Embryology of fishes; with a plate—p. 345-364. (Auerbach) On the unicellular structure of *Amœba;* with four plates—p. 365-433. (Cohn) On the propagation of the Rotifera; with two plates—p. 434.

Supplementary Part. April 1st, 1856.

(Carus) Annual Report on the works on Zootomy, published from 1849 to 1852—pp. 228.

Archiv fuer Anatomie, Physiologie und Wissenschaftliche Medicin: herausgegeben von Dr. Johannes Müller. Mueller's Archives of Anatomy, Physiology, etc. 8vo. Berlin.

Vol. for 1854; with twenty-one plates.

General Physiology, etc. (Remak) On ciliary vesicles—p. 184, 185. (Same) On the Egg-capsule, and on Spermatozoa—p. 252–256. (Same) On the Division of animal Cells—p. 376. (Volkmann) Illustration and defence of the Hydraulic principles adopted in his work on Hæmodynamic—p. 119–153. Human and Comparative. (Burow) The Yellow spot, visible to the observer, in his own Eye—p. 166-169. (Castell) Condition of the Heart in different gaseous Media—p. 226-251. (Fick) Remarks on the Physiology of Sight—p. 220–225. (Frerichs and Staedeler) Occurrence of Leucine and Tyrosine in the human liver—p. 382–393. (Same) Occurrence of Allantoin in the urine in cases of disturbed respiration—p. 394–397. (Horner) On the normal curvature of the Spine; with a postscript by Meyer; two plates—p. 478–511. (Jager) Comparative Anatomy of the Lumbo-costal muscle—p. 160–165. (Luschka) The long muscle of the neck in man; with a plate—p. 103-118. (Same) The Lumbo-costal muscle in man—p. 153–159. (Mazom) Histology of the Smooth muscles, and existence of such in the human spleen; with figures—p. 25-40. (Reissner) On the Cochlea of the ear, in Mammalia and man; with figures—p. 420–427. (Remak) On the Contraction of the Amnion—p. 369-373. (Retzius) On ancient Skulls shaped by artificial means—p. 439-448. (Zimmerman) On Serumcaseine—p. 377–381. Vertebrate. (Lieberkuhn) On Psorospermia; with two plates—p. 1-24, 349-368. Observed in Fishes and Amphibia; with reference to Leydig's suggestion on the origin of *Gregarinae.* (Mueller) On the numerous porous channels in the Egg-capsule of Fishes; with figures—p. 186–190. (Remak) Multinuclear cells of the liver; with figures—p. 99–102. Observed in the embryo of the Duck. (Same) On the plan of development of Vertebrate animals—p. 374, 375. (Weinland) On *Notodelphys;* with three plates—p. 449-477. A tree-frog, from Venezuela, the eggs of which are hatched in its dorsal sacs. Though similar in this point of natural economy, it seems not to be congeneric with *Hyla marsupiata* of Dumeril and Bibron. (Wittich) The green colour of the skin of frogs, the physiological and pathological changes of it —p. 41–59. (Same) Mechanism of the prehensile toes of *Hyla arborea;* with figures—p. 170-183. (Same) Reply to Harless, on the Chromatophora of the frog—p. 257-264. (Same) On the metallic gloss of fishes—p. 265-269. Invertebrate. (Claparede) On *Actinophrys eichornii;* with figures—p. 398-419. (Krohn) Observations on the larvæ of Echinodermata; with figures—

p. 208-213. *Spatangus purpureus* (Tornaria) forms the main subject of this article. (Leydig) Remarks on the structure of Hydræ; with figures—p. 270-283. (Same) Brief communications on the Histology of animals; with two plates—p. 296-368. (Same) Zoological Notes; with a plate—p. 284-295. Illustrating the following Turbellariæ; *Stenostomum coluber* Ldg.; *Catenula lemnæ* Duj. (referred to the Bothriocephala by Dujardin), *Monocelis bipunctata* Ldg., *Planaria gonocephala* Duj. (*P. cornuta* Oersted?), *Prorrhynchus fluviatilis* Ldg., a freshwater Nemertid;—and Nematodea; *Oncholaemus rivalis*, *echini* Ldg.; *Enoplys tridentata* Duj. (Mayer) On spontaneous motion of the muscular fibres in the lower classes of animals—p. 214-219. (Müller) On the channel in the eggs of Holothuriæ—p. 60-68. (Same) Various forms of marine animals; with three plates—p. 69-98. These observations regard the larvæ of Pteropoda and Planariæ; *Pilidium*, *Actinotrocha*, *Mitraria*, *Brachiolaria*, &c. (Schmidt) On the development of *Cyclas calyculata* Drapiez; with a plate—p. 428-438. (Schneider) Contributions to the Natural History of the Infusoria; with a plate—p. 191-207. *Polytoma uvella* is the chief subject. The following also are noticed, *Chlorogonium euchlorum; Chilomonas paramecium;* the phenomenon of encystment observed also in *Stylonychia punctulata*, *Euplotus charon*, *Pontotrichum hagenella*, *Difflugia enchelys*. Report (by Reichert) on the Progress of Microscopical Anatomy during the year 1853—pp. 80.

Vol. for 1855; with twenty plates.

General Physiology, etc. (Fick) On the form of the Stethoscope; with figures—p. 32, 33. (Schulz-Schulzenstein) On Spontaneous motion of the muscular fibres—p. 265-268. Human and Comparative. (Bergmann) Notes on the Anatomy of man and animals—p. 337-356. (Busch) Histology of the Kidneys; with a plate—p. 363-375. (Luschka) On the development of the joints; with a plate—p. 481-488. (Retzius) On the skull of a Pampas Indian p. 498-503. (Schlossberger) Chemical conditions of the fœtal life—p. 504-511. (Wundt) Influence of the section of the Pneumato-gastric nerves on the organs of respiration—p. 269-313. Vertebrate. (Haeckel) On the eggs of *Scomberesox;* with two plates—p. 23-31. (Leydig) The posterior sclerotic ring of the eye of birds; with figures—p. 40-46. (Retzius) On the large drops of grease in the eggs of fishes—p. 34-39. An extract from the Proceedings of the Swedish Academy of Science for the year 1854. Invertebrate. (Busch) Anatomy of the Trichodina; with a plate—p. 357-362. (Krohn) On the offshoots of *Autolytus prolifer* Grube, (*Nereis prolifera* Müller)—p. 489, 490. (Same) On the early stages of growth of *Pelagia noctiluca;* with a plate—p. 491-497. (Leydig) *Cyclas cornea* Lam., its anatomy and development; with figures—p. 47-66. (Same) On the minute structure of the Arthropoda; with four plates—p. 376-480. (Leuckart) On the Micropyle, and the minute structure of the shell of insects' eggs; with five plates—p. 90-264. (Lieberkuehn) Contributions to the Anatomy of the Nematodea; with two plates—p. 314-336. Observations on *Spiroptera inflata?* Mehlis, a species from the crop of seabirds. (Mueller) On the advanced development of *Mesotrocha sexoculata;* with a plate—p. 1-12. Showing it to be the larva of *Chaetopterus norvegicus*. (Same) On *Sacconereis helgolandica;* with two plates—p. 13-22. (Same) Continuation of Observations on the metamorphosis of the Echinodermata—p. 67-89. The following Echinodea are illustrated; *Ophiura; Bipinnaria;* and *Brachiolaria*, a new species.

The sixth and concluding part of this volume, which should contain the Report on the Progress of Microscopic Anatomy during the year 1854, has not yet come to hand.

Zeitschrift der Deutschen Geologischen Gesellschuft. Journal of the German Geological Society. 8vo. Berlin.

Vol. IV. Part 4. 1854.

(Beyrich) Shells of the Tertiary mountain system of Northern Germany. Part 3. Tritonium, Murex, Tiphys, Spirilla, Leiostoma, Pyrula; with four plates—p. 726-781. (Fraas) *Squatina acanthoderma*, the fossil Skate of Nusplingen; with three plates—p. 782-799. (Mueller) The Alum-ore of the Tertiary formation; with a plate—p. 707-724. (Noeggerath) On Native lead,

Natural litharge and cinnabar—p. 674-706. Correspondence—p. 668-673. Proceedings—p. 617-667. Index—pp. 8.

Vol. VII. Part 1; with eleven plates. 1855.

(Castendyck) The Red iron-stone beds of the Briloner Eisenberg pit, near Olsberg; with a plate—p. 253-260. (Huyssen) The brine-springs of the chalk formation of Westphalia; their site and hypothetical origin; with six plates—p. 17-252. (Nœggerath) Notice of some caves containing bones, in the district of Arnsberg—p. 293-295. (Reuss) A contribution to the history of the chalk formation of Mecklenburg; with four plates—p. 161-292. (Roth) Metamorphosed chalk of Divis mountain, near Belfast—p. 14-15. (Same) Mica in the mould of Andalusite—p. 15-16. Correspondence—p. 11-13. Proceedings—p. 1-10.

Abhandlungen der K. K. Geologischen Reichs-Anstalt: in drei Abtheilungen. Transactions of the Imperial Geological Institute; in three Sections. 4to. Vienna.

Vol. XI. 1855; with seventy-eight plates.

(Pettko) Geological chart of the district of Schemnitz; with a coloured map—pp. 8. The whole Trachytic region of Schemnitz, stretching east, south, and south-west, to Kremnitz connectedly, presents the appearance of one vast crater of elevation, forming a Trachytic ring. To the north and west a great variety of Geological configuration prevails. (Ettinghausen) The Tertiary Flora of the environs of Vienna; with five plates: A.D., 1851—pp. 36. The fossil flora of this district, which belongs to the Miocene period, includes the representatives of twenty-six genera, two of which are new to the Tertiary Flora. Of thirty-three species distinguished, thirteen have been already observed elsewhere. The strongest analogy is to the Tertiary Flora of Upper Styria. (Same) The Tertiary Flora of Haring in the Tyrol; with thirty-one plates: A.D., 1853—pp. 118. This is one of the richest and longest known fields of the Tertiary Flora in the Austrian Empire. One hundred and eighty species are enumerated, derived from the carboniferous deposits of the Eocene period. The vegetation indicates a tropical climate, the mean temperature of which may have ranged between 18° and 20° of Reaumur. Palms occur, along with many Dicotyledonous forms of purely tropical character. The condition of the soil was probably analogous to that of New Holland at the present day. One species only has been recognized which may be supposed to have grown in a large lake. (Same) The Flora of the coal-measures of Radnitz in Bohemia; with twenty-nine plates—pp. 74. Some remarkable fossil forms occur in these deposits, to which there are none analogous in the present vegetation of the earth. One hundred and fifty-one species of plants are enumerated. The ancient locality seems to have been the interior of a large Island, enclosing several Lagoons. (Andræ) A contribution to the history of the Fossil Flora of the Siebenburgen and of the Bannat; with twelve plates: A.D., 1855—pp. 48. The Siebenburgen have yielded thirty species, of which sixteen as yet have been found there only. They belong to twenty-five genera, representing twenty-two distinct families of plants. The vegetation, generally, wears a subtropical character, although it includes the analogues of some trees which grow in central Europe at the present day.

Jahrbuch der K. K. Geologischen Reichsantalt. Annual of the Imp. Geological Institute. For the year 1854. 4to. Vienna. Vol. V. No. 4, 1855; with seven plates:—(Kokscharow) On Clinochore from Achmatowsk, and Mica of double axis from Vesuvius; with figures—p. 852-866. (Peters) The Geological relations of the Oberpinzgau, especially the Central Alps—p. 766-808. (Same) The Geological relations of the North of the Radstadt Tauer (mountain)—p. 808-818. (Prestel) On the crystalline structure of Meteoric iron, as a test—p. 866-868. (Stur) The Geological condition of the Central Alps, between the Hoch-Golling and Venetian, with seven plates—p. 818-852. Proceedings—p. 874-914. Operations of the chemical laboratory—p. 868-874. Index—p. 915-965.

Vol. VI., for 1855.

No. 1, 1855.—(Cotta) The metalliferous localities of Southern Bukovina ; with figures—p. 103-135. (Foetterle) A new locality for Magnelite in Styria—p. 68-72. (Ferstl) Analysis of a new mineral Spring at Rohitsch—p. 39-42. (Glocker) Mineralogical observations in Moravia; with figures—p. 95-103. (Hauer) On the cement of the Vienna Sandstone—p. 42-46. (Same) On crystallized Acetate of Magnesia—p. 136-138. (Same) On some sorts of coal from Rossitz, in Moravia—p. 139-142. (Hoffmann) Localities of the sulphurous lead-ore of Neu-Sinka in Siebenbuergen. (Hauer) Analysis of same ; and Remarks (by Haidinger) ; with figures—p. 1-9. (Hochstetter) Geognostical studies of the Bohemian forest : II., the Granite and Granitic Porphyry ; with figures—p. 10-39. (Kleszczynski) The Mineral species and Pseudomorphoses of Pirbram, according to their localities—p. 46-64. (Koristka) Report on measurements of heights in Central Moravia, continued, graduated map of the environs of Brunn ; with a plate—p. 72-88. (Lipold) Determinations of heights in N. E. Carynthia—p. 142-153. Catalogue of Minerals, etc., received at the Institute—p. 161-163. Proceedings—p. 164-217.

SWITZERLAND.

Neue Denkschriften der Allgemeinen Schweizerischen Gesellschaft fuer die Gesammten Naturwissenschaften, *alias*, Nouveaux Memoires de la Société Helvetique des Sciences Naturelles. New Memoirs of the Swiss Society of the Natural Sciences. 4to. Zurich. Vol. XIV. 1855.

(Renevier) Geological memoir on the Perte du Rhone, and the surrounding district ; with four plates—pp. 72. (Greppin) Geological Notes ; with three plates—pp. 72. (Laharpe) Lepidopterous Fauna of Switzerland ; second supplement to the Phalænidæ ; and part fifth, the Pyralidæ ; with a coloured plate—pp. 112. The following species are figured—*Ephyra schæfferaria* Lah. (*gyraria* Tr., not of Hbn.) ; *Eupithecia majoraria* Lah. ; *Larentia livinaria* Lah. ; *Botys cyanalis* Lah. ; *Eudorea ancipitella* Lah. ; *Crambus rostellus* Lah. The list includes seven Pyralidæ, and one hundred and sixty-nine Crambidæ. (Volger) On the mutual relation of Epidote and Garnet—pp. 60.

Bulletin de la Societe Vaudoise des Sciences Naturelles. Bulletin of the Vaudois Society of the Natural Sciences. 8vo. Lausanne.

Vol. IV. No. 32-34. 1854. Memoirs. (Chavannes) Essay on the Geology of a part of the foot of the Jura, lying between Nozon and Yverdon—p. 14-24. (Same) Observations on some particulars of the fecundation and artificial hatching of the eggs of fishes—p. 24, 25. Directions for the destruction of the caterpillar of the vine—p. 26, 27. (Gaudin) On a new species of fossil *Chara*, and on the structure of these petrified fruits—p. 28-30. (Morlot) Note on the land-slip of Berney—p. 37, 38. (Same) Note on the Glacier-attrition of rocks in situ, in the district of the Molasse—p. 38, 39. (Same) Observations on a case of superposition of Diluvium over the Erratic—p. 39, 40. (Same) Note on the Quaternary system in Switzerland—p. 41-45. (Yersin) On some new or little known Orthoptera of the South of France ; with two plates—p. 63-70. The new species are—*Ephippigera terrestris, provincialis ; Odontura fischeri ; Decticus sepium.* (Morlot) Bones from the Glacier-diluvium of the neighbourhood of Lausanne—p. 71-82. (Same) Description of the fossil deposit of the Tunnel at Lausanne—p. 82-92. (Same) On the Diluvian terraces of the Leman lake—p. 92, 93. (Laharpe) On a contagious malady among cats, in the Canton de Vaud—p. 93-95. (Yersin) Memoir on some facts respecting the stridulation of the Orthoptera, and on their Geographical distribution in Europe; with a plate of musical notation—p. 108-128. (Laharpe) Notice of some new or little known Pyrales of Switzerland—p. 138-149. (Blanchet) Thoughts on the modifications of the Elevation of the soil in the valley of the Rhone and Leman—p. 157-161. (Chavannes) Note on an ancient bed of the Morge—p. 161-163. (Nicaty) Note on an erratic block of great magnitude existing in the ravine of Aubonne—p. 174. Proceedings, &c.

No. 35. 1855. Memoirs. (Renevier) On the classification of the Cretaceous strata—p. 191-193. Extract from a letter of Mr. Bieler, on the scabies of the cat; produced by *Sarcoptes cati*—p. 194, 195. (Laharpe) Bones of *Anthracotherium magnum*, found in the Lignite of the environs of Lausanne—p. 195–203. (Renevier) Second note on the Geology of the Vaudois Alps—p. 204–218. (Laharpe) On the Oidium of the vine in 1854—p. 229-232. (Same) On the Iron-stone formation in the Alps—p. 232-236. (Same) Catalogue of the Swiss Pyrales—p. 237-242. (Chavannes) On the early states of *Calliomma pluto*, a Brazilian Sphingid; with a plate—p. 243, 244.

Memoires de la Societe de Physique et d'Histoire Naturelle de Geneve. Memoirs of the Genevese Society of Physics and Natural History. 4to. Geneva. Vol. XIV. Part I.

(Saussure) Hymenopterological Miscellanies, I. Vespidæ; Crabronidæ; Bembecidæ; Scoliadæ; with a plate—p. 1-67. A collection of corrections of the Synonymy; a critical review of several genera, and descriptions of a considerable number of new species. A new genus of Crabronidæ is characterized, *Tachyrrhostus*, which may form the type of a peculiar tribe in this family. In general form the resemblance is close to *Tachytes* and *Astata*, but the antennæ form an arched club; the veining of the wings, also, is quite different, and the eyes do not approach on the crown of the head. The only species known, *T. viridis*, is Australian. (Pictet) Notice of some Anomalies of Organization; with four plates—p. 69-90. A description of some monstrosities of domestic quadrupeds. (Choisy) Memoir on the families Ternstrœmiaceæ and Camelliaceæ; with three plates—p. 91–184. (Thury) Observations on the floral organogenesis of *Hemerocallis fulva*; with a plate—p. 187-200.

HOLLAND.

Natuurkundig Tijdschrift voor Nederlandsch Indie. Journal of Natural Science for Dutch India. New Series. Part III. Nos. 3 to 6. 8vo. Batavia. 1854.

(Bleeker) New or little known species of fishes of Batavia—p. 191–202. (Same) Fresh contributions to the Ichthyology of Timor—p. 203-214. (Same) Contribution to the Ichthyology of Floris Island—p. 311–338. (Same) New species of Japanese fishes—p. 395-427. (Same) Fifth contribution to the Ichthyology of Amboina—p. 455-508. (Arndt) Measurement of the skulls of natives of Java, Celebes, and Amboina—p. 215-222. (Hugenin) Mineralogical examination of the Copper ores of the Residency PadangUpperland; sixth contribution to the Geology and Mineralogy of Dutch India, by Engineers of the Mining Institute—p. 223-254. (Maier) Chemical examination of Obsidian occurring in Java—p. 301-310. (Same) Chemical examination of the mineral water of the Mother well, in the district of Goenong Kending, regency Soerabaja —p. 389-394. (Maier and Loudon) On the occurrence of Tin in the Isle of Biliton—p. 339–342. (Temminck) On some new species of Squirrels from the Indian Archipelago—p. 343–348. (Altheer) Chemical examination of the mineral substance eaten by some of the workmen in the Coal-mine Orange-Nassau, in Borneo—p. 379-388. (De Bruijnkops) On some investigations in the Ocean—p. 427-447. (Smit) Results of the search for coal in the neighbourhood of Mew-bay, S.W. extremity of Java—p. 509-516. Index of the species of fishes of Malacca, Moluccas, and Japan, described in the 6th volume of this journal, with the habitats—p. 544–546. Miscellaneous Notices—viz.—Volcanic phænomena in the Indian Archipelago. Operations of the Engineers of mines in Dutch India. The Tap-aloe and some mineral waters of Manado. Use of coffee-leaves in Sumatra. *Syngnathus tapeinosma*, a new salt-water eel from Anjer (Bleeker). *Diagramma polytœnioides*, n. sp., from Solor (Same)—p. 363–378. Volcanic phænomena in the Indian Archipelago. Hot spring in the valley of Telokbetong. Operations of the Engineers of mines. *Eleotris tolsoni*, n. sp., from the vicinity of Mew-bay, western extremity of Java (Bleeker). Extracts of Proceedings of the Meeting and Council of the Society, from April 29th to June 3rd, 1854—p. 349–362, and June 22nd to July 6th, 1854—p. 517–534.

FRANCE.

ARCHIVES DU MUSEUM D'HISTOIRE NATURELLE. ARCHIVES OF THE MUSEUM OF NATURAL HISTORY. 4to. Paris. Vol. VIII. Part III. 1855.

(Tulasne) Monographia Monimiacearum; with ten plates—p. 272–436.

BULLETIN DE LA SOCIETE GEOLOGIQUE DE FRANCE. BULLETIN OF THE GEOLOGICAL SOCIETY OF FRANCE. Part XII. 8vo. Paris. 1855.

(Pareto) Note on the Nummulitic district at the foot of the Appenines; with a plate—p. 370. (Coquand) Note on the Pea-iron-ores of la Charente—p. 395. (Lassaigne) Letter on the process proposed (p. 361) by Mr. Delanoue for the analysis of Calcareous soils—p. 399. (Lyell) Extract of a Report on the Geological department of the New York Exposition; translated by Laugel—p. 400. (Gueymard) Memoir on the Platina of the Alps—p. 429. (Greenough) On the Geology of Hindostan; translated by De Beaumont—p. 433. (Barrande) On organic repletion of the Siphon in certain extinct Cephalopoda; with a plate—p. 441. (Pomel) Geological notice of the country of the Beni-Bou-Said, near the frontier of Morocco—p. 489. (Logan) On the Graptoliths of the Silurian formation in the environs of Quebec, L. Canada—p. 504. (Sismonda) On the two Nummulitic formations of Piedmont; extract from a letter addressed to Mr. E. de Beaumont—p. 508. (Lory) Note on the lower strata of the mountain of Crussol, near Valence—p. 510. (Gueymard) Note on beds of Nickel in the department of Iserè—p. 515. (Omboni) On the succession of sedimentary deposits in Lombardy; with a plate—p. 517. (De Beaumont) Extract from his Memoirs, entitled "Data for the History of the mountains of l'Oisans," and from that of Mr. Charpentier, "On the environs of Bex"—p. 534. (Laugel) Abstract of the researches of Mr. Studer among the Alps of l'Oisans—p. 570. (Gaudry) Abstract of the works on the Anthraciferous strata of the Alps of France and Savoy; with a plate—p. 580. (Sismonda) Note on some fossils found by him at the Col des Encombres, Savoy—p. 631. (Gaudry) Abstract of his reviews of the Memoirs on the Anthraciferous strata of the Alps—p. 636. (Same) Alphabetical table of the localities, in the Alps of France and Savoy, which have been the special subjects of examination by Geologists—p. 642. (De Beaumont) Remarks on the map, plate XIV.—p. 670. (Michelotti) On various fossils collected at the caves of St. Lazarus, near the Havanna, Cuba—p. 675. (Barrande) Notice of two works presented by Prof. Geinitz—p. 678. (Roemer) Discovery of Graptolites in the valley of the Innerst, near Lauthenthal, in the Harz—p. 685. (D'Hombres-Firmas) Note on *Terebratula diphya*—p. 686. (De Serres) Letter respecting a note by Mr. Coquand on the Permian formation of the environs of Lodevè—p. 688. (Bouè) Letter on various subjects—p. 689. (Cotteau) On the age of the lower and middle beds of the Coralline stage, in the department of Yonne—p. 693. (Same) Note on *Desorella*, a new genus of fossil Echinoids—p. 710. (Beaudouin) Note on the composition of the strata of the Arrondissement of Chatillon on Seine, Cote d'Or—p. 716. (Triger) On the jurassic strata in the environs of Weymouth, Isle of Portland, in England—p. 723. Observations on the preceding—p. 726. (Delanoue) On the formation of Silex—p. 732. (Haime) On the Geology of the island of Majorca; with a plate—p. 734. (Duchassaing) Observations on the recent formations of the isle of Guadeloupe—p. 753. (Hebert) Note on the middle Tertiary formation of the North of Europe; with a plate—p. 760. (Bayle) Observations on the structure of the shells of *Hippurites*, followed by some remarks on Radiolites; with three plates—p. 772. (Sismonda) On the Nummulitic beds; letter to Mr. De Beaumont—p. 807. (Marcou) Geological notes on the country between Preston, on the Red River, and El Paso, on the Rio Grande del Norte—p. 808. (Same) Explanation of a Geological map of the U. S. and of the British Provinces of N. America; with two plates—p. 815.

GREAT BRITAIN.

THE ANNALS AND MAGAZINE OF NATURAL HISTORY; including Zoology, Botany, and Geology. No. 100, April; No. 101, May; No. 102, June, 1856. 8vo. With Plates. London: Taylor and Francis. Price, 2s. 6d. each.

No. 100, April:—(E. Claparède) On the theory of the Fecundation of the

Ovum. (Charles C. Babington, A.M., F.R.S.) On some species of Epilobium. (J. Gwyn Jeffreys, F.R.S.) Note on the Genus Scissurella. (Prof. O. Heer, of Zurich) On the House Ant of Madeira; translated from the original by R. T. Lowe, A.M.; with a plate. (William King, Professor of Mineralogy and Geology, Queen's College, Galway) Notes on Permian Fossils; Palliobranchiata. (W. H. Benson) Remarks on the Genera Tanystoma, Nematura, and Anaulus. (M. Tulasne) New researches in Vegetable Embryogeny. (Thos. Williams, M.D., F.L.S.) On the tracheal system of Insects. Bibliographical Notices. Proceedings of Learned Societies. Miscellaneous.—On the mode in which the Tachinæ escape from their Pupa-cases, and from closed situations in which they often occur; by Dr. Reissig. On the apparent absence of a nervous system in the Nemoptera Lusitanica; by M. Leon Dufour. Meteorological Observations and Table for February, 1856.

No. 101, May:—(Charles C. Babington, A.M., F.R.S.) On the British species of Arctium. (R. M'Andrew, F.L.S., and L. Barrett, F.G.S.) List of the Mollusca observed between Drontheim and the North Cape. (Alfred R. Wallace) Some account of an infant Ourang-utan. (E. Claparède) On the theory of the fecundation of the Ovum. (S. P. Woodward, F.G.S.) Another note on Scissurella and on the Occurrence of the Fossil Genus Conoteuthes, *D'Orb.* in England. (N. Lieberkühn) On the Development of the fresh-water Sponges. (Prof. S. Loven) On the Development of the Chitons. (Arthur Henfrey, F.R.S.) On cell-development in Plants. Bibliographical Notices. Proceedings of Learned Societies. Miscellaneous.—The British Museum; its catalogue and accessions in Zoology. On the development of the Lampreys; by M. Schultze. Note on Clausilia Mortilleti; by C. Prentice. On a supposed new species of the Genus Equus; by M. I. Geoffroy Saint Hilaire. Meteorological Observations and Table for March, 1856.

No. 102, June:—(C. Spence Bate, F.L.S.) On the British Diastylidæ; with three plates. This is a most important paper to the British carcinologist, and proves beyond all question that these animals are not the larva state of any Crustacean, but independent species in themselves. (J. E. Gray, F.R.S.) Description of a new species of Sphærium found near London. (P. L. Sclater, A.M.) Descriptions of eight new species of Birds from South America. (J. Gwyn Jeffreys, F.R.S.) On Scissurella and Schismope. (Alfred R. Wallace) On the Ourang-utan, or Mias of Borneo. (H. Falconer, M.D., F.R.S.) On Prof. Huxley's attempted refutation of Cuvier's Laws of Correlation, in the re-construction of extinct Vertebrate Forms. (W. H. Benson) Descriptions of three new species of Paludomus from Burmah, and of some forms of Stenothyra (Nematura) from Penang, Merqui, &c. (W. B. Carpenter, M.D., F.R.S.) On the minute structure of certain Branchiopod Shells, and on Vegetable Cell-formation. Bibliographical Notices. Proceedings of Learned Societies. Miscellaneous.—On the influence of the soil on the Distribution of Plants; by M. Steer. Note on the Fresh-water Dolphins of South America; by M. Paul Gervais. Meteorological Observations and Table for April, 1856; with title-page, index, &c., to Vol. XVII.

Edinburgh New Philosophical Journal; exhibiting a View of the Progressive Discoveries and Improvements in the Sciences and Arts. Edited by Thomas Anderson, M.D., Sir W. Jardine, Bart., and T. H. Balfour, M.D. No. 6, April, 1856: to be continued quarterly. 8vo. Price 6s., with eight Plates.

(James D. Forbes, Professor of Natural Philosophy in the University of Edinburgh) On the Geological relations of the Secondary and Primary Rocks of the Chain of Mont Blanc (with a map). (A. A. Hayes, M.D.) On a specimen of native Iron from Liberia, Africa. (Professor William B. Rogers) On the Form of the curve resulting from the binocular union of a straight line with a circular arc, or of two equal circular arcs with one another. Astronomical Contradictions and Geological Inferences respecting a Plurality of Worlds. (William Jardine, Bart.) Contributions to Onithology, No. III. Ornithology of Eastern Africa. Natal Collections. (Alexander Thomson) Remarks on Professor Baden Powell's views respecting the Recent Origin of man upon the earth, and the skeleton found in

excavating Mickleton Tunnel. (Hugh Macmillan, F.B.S.E.) On the rare Lichens of Ben Lawers. (Charles Jenner) On the spores of Cryptogamic plants. (Richard Edmonds, jun.) An account of an Earthquake shock, on the 30th May, 1855, and of an extraordinary agitation of the sea on the 6th June, 1855, in Penzance; with observations as to the cause of the latter. (William Crowder, F.C.S.) Report on the Chemical composition of the Cleveland Ironstone Beds. (Alexander Bryson, &c.) On an improved method of preparing siliceous and other Fossils for microscopic investigation, with a description of a new Pneumatic Chuck. Reviews, Proceedings of Societies, Scientific Intelligence.

Quarterly Journal of Microscopical Science. No. 15. April, 1856. 8vo. Price 4s. With Woodcuts and a Lithographic Plate. London: John Churchill.

Transactions of the Microscopical Society of London. A simple form of portable Microscope, with lever adjustment, which may be adapted to several purposes; by Lionel Beale, M.B., &c.; with figures. Report of the Sixteenth Annual Meeting of the Society, and Address of the President. Journal of Microscopical Science. Original Communications. Further observations on the structure of *Appendicularia flabellum*; by T. H. Huxley, F.R.S.; with a plate. Note on the Reproductive organs of the Cheilostome Polyzoa; by the Same. On the Reproductive organs of certain fungi; with some remarks on Germination. No. II.; by Frederick Currey, M.A. On the similarity of form observed in snow crystals as compared with those of Camphor, under certain circumstances of crystallization; by Joseph Spencer, Esq. Further observations on the same; by James Glaisher, F.R.S. On an easy method of viewing certain of the Diatomaceæ; by J. Charles Hall, M.D. On defining the position and measuring the magnitude of Microscopic objects; by the Rev. W. Hodgson; with figures. On the development of the Enamel; by John Tomes, F.R.S., &c. Contributions to Micro-mineralogy; by Samuel Highley, F.G.S., F.C.S., &c. Reviews. Rudiments of Pathological Histology; by Karl Wedl, M.D.; translated and edited by George Busk, F.R.S. The Micrographic Dictionary; by J. W. Griffith, M.D., and A. Henfrey, F.R.S. The Microscope and its revelations; by William B. Carpenter, M.D., F.R.S., &c.; with figures. Notes and Correspondence. Proceedings of the Microscopical Society; Dec., 1855, to February, 1856.

The Zoologist. No. 162, April; No. 163, May; No. 164, June, 1856. 8vo. London: John Van Voorst. Price 1s. each.

No. 162, April:—Letters on Natural History, by the late Fred. Holme, Esq., to E. H. Rodd. Notices of New Books.—(Rev. Hamlet Clark, A.M.) Synonymic List of the British species of Philhydrida, with notices of localities. We hope Mr. Clark will be induced to continue these notices of British Coleoptera. (J. Couch) Remarkable act in a Fox. (A. Hussey) Deer feeding on Horse Chesnuts. (A. C. Smith) Origin of the name Horse Chesnut. (A. F. Sealy) Honey Buzzard breeding in Hampshire. (H. W. Hadfield) Migration of the Swallow Tribe. (A. C. Smith) Particulars of the Occurrence of the Great Bustard near Hungerford. (A. F. Sealy) Occurrence of the Great Bustard (Otis tarda) in Cambridgeshire. (Hamlet Clark) Occurrence of Atypus Sulzeri in Britain. (R. H. Meade, F.R.C.S.) On the Preservation of Spiders. (J. C. Dale) Capture of Doritis Apollo in Britain. (S. C. Tren Beale) Capture of Pamphila Actæon at Lulworth Cove. (J. C. Dale) Note on the Occurrence of Exotic Sphinges in Britain:—and prefixed thereto a wicked little note by the Editor, which has caused a good deal of hubbub in the entomological world. (Edwin Sheppard) Notodonta Camelina not double brooded.

No. 163, May:—(Joseph Greene) Adaptation of the colouring of Moths to Autumnal Tints. (G. Wailes) On the Occurrence of Lampronia prælatella, Nomada borealis, and xanthosticta, and Fenusa pumila. (John N. Winter) Occurrence of Chœrocampa Celerio near Brighton. (E. Parfitt) Note on Cynips lignicola and description of its parasite (Callimome flavipes). (Edward Newman) What is Ilybius angustior? (John Scott) Whom shall we follow? another necessity and a few words about advertisements. (C. Miller) Terra

incognita. (Thomas Boyd) What is indigenous? Proceedings of Societies.—Linnean Society, March 4-18, April 1, 1856; Entomological Society, March 3, April 6, 1856. Notices of New Books.—Annals and Magazine of Natural History; Quarterly Journal of Microscopical Science; Journal of the Proceedings of the Linnean Society; Natural History Review. (W. S. M. D'Urban) Piscivorous propensity of the Water Campagnol. (James Hardy) Occurrence of the Round-headed Porpoise at Oldcambus. (W. S. M. D'Urban) Occurrence of the White-tailed Eagle in Devonshire. Note on the early arrival of the Sand-martin and Chiffchaff. (C. Buchanan) Honey Buzzard breeding in Britain. (H. W. Hadfield) Early arrival of the Willow Wren; Familiarity of the House Sparrow; Note on the Hoopoe. (Henry Doubleday) Colour of the beak of the Hawfinch. (Thomas Tapping) Observations on the Genus Testacellus, and description of a new species. This species stands "Testacellus Medii Templi, *Thomas Tapping*;" such the euphonious nomenclature of this new slug—going back, this, to the forty word specific name of Ray. (Joshua Brown) Note on Atypus Sulzeri. (H. T. Stainton) The Small Spider of the Origanum. (E. C. Buxton) Note on Argynnis Lathonia and Pieris Daplidice. (H. Austin) Parnassius Apollo at Ealing. (R. Weaver) Chrysophanus dispar in Staffordshire. (S. Stone) Recent Entomological Captures in the neighbourhood of Witney, Oxon. (E. Smith) Cloantha conspicillaris. (B. Smith) Noctua leucographa. (J. J. Reading) Dasycampa rubiginea. (H. J. Harding) Aleucis pictaria. (A. F. Sheppard) Ennomos Alniaria at Margate, Kent. (John Scott) Coleophora alcyonipennella; Ornix Loganella; Lithocolletis irradiella. (G. Edwards) Bombus sorœnsis. (Thos. John Bold) Capture of Nitidula flexuosa and of Alphitobius picipes at South Shields. (A. R. Hogan) Query as to Helophorus dorsalis, *Marsh.* (J. Farr) Origin of the name Horse Chesnut.

No. 164, June:—(A. R. Wallace) Observations on the Zoology of Borneo, dated from Singapore, March 10, 1856. (Thos. Edward) List of the Birds of Banffshire. (W. M. H. Church) The Nightingale near Oundle. (J. P. Wilmot) An Egg prodigy. (H. Stevenson) Note on the late appearance of the common Scoter and Scaup Duck in Norfolk. (Edward Newman) The Miller's Thumb in confinement; What is Gasterosteus pungitius? and is it British? (Dr. Frazer) Some observations on the disease in Fish called fungus, which is so fatal in Aquaria, fish ponds, &c. (Edward Newman) Horse Leech swallowing a Worm. (H. T. Stainton) Entomological Botany; with more especial reference to the Plants frequented by the Tineina. (Henry Doubleday) List of the British Eupitheciæ; with notes on some of the species. This list has affixed all the synonyms, and is a most valuable contribution to those studying our native lepidoptera. (James Haughton, jun.) Some remarks on the economy of Granivorous Lepidopterous Larvæ. (Edward Newman) Food plant of Anthocharis Cardamines, and on the Capture of Lebia crux-minor and Bembidium obliquum at Brighton. (H. Doubleday) Remarks on Mr. Buxton's note on Argynnis Lathonia and Pieris Daplidice. (E. C. Buxton) Pieris Daplidice and Argynnis Lathonia. (A. F. Sheppard) Occurrence of Vanessa Antiopa at Cobham, Surrey, and of Notodonta carmelita at West Wickham. (Edwin Sheppard) Error in the Entomologist's Weekly Intelligencer. (H. Harpur Crewe) Double-broodedness of Notodonta camelina. (S. Stone) Do the males of certain of our Lepidopterous Insects become possessed of an instinctive knowledge of the "whereabouts" of the Females even before the latter emerge from the Pupa. (W. H. Lowe) Capture of Elaphrus lapponicus in Glenalmond, Perthshire. (Edward Parfitt) Description of the Male of Callimome flavipes. Proceedings of Societies.—Entomological Society, May 5, 1856.

Transactions of the Entomological Society of London. New Series. 8vo. London. Vol. III.; with eighteen plates. 1854–1856.

(Curtis) Two species of Hemerobius L. new to Britain, viz., *Sisyra terminalis* Curtis n. sp. and *Hemerobius dipterus* Burm.; Remarks on nomenclature of g. *Coniopteryx* and on *Orthotœnia buoliana* W. Vz., and its parasite *Cremastus buolianæ* Curtis n. sp.—p. 55–60. (Newman) Two undescribed species of *Thrips* L.—p. 264-267. (Curtis) Coleopterous larvæ; with a plate—p. 33–40.

(Saunders, W. W.) Characters of undescribed Lucanidæ, collected in China by R. Fortune, Esq.; with two plates—p. 45–55. Fourteen new species are here described and figured. (Westwood) New species of exotic Lucanidæ; with three plates—p. 197–221. Twenty-three species are described, and nearly all figured, of which fifteen as new. (Same) Supplemental descriptions of species of African, Asiatic, and Australian Cetonidæ; with two plates—p. 61-74. Seven new species are described and figured. (Curtis) Critical remarks on British Elateridæ, with descriptions of some of the species; with a plate—p. 10–17. (Janson) Observations on the specics described by Mr. Curtis —p. 222-224. (Westwood) *Gnostus* n. g. inhabiting ants' nests in Brazil; with a plate—p. 90-94. The species *G. formicicola* Westw. was found by Mr. Bates in the nests of *Myrmica victima* at Santarem. Mr. Westwood considers it as the type of a peculiar sub-family of the Xylophaga Latr. It is peculiarly remarkable for the structure of the antennæ, which are composed of only three joints, all after the second being united in a solid mass. The ventral segments are but three, the intermediate one very short. (Same) Four new species of Paussidæ—p. 81-83. (Waterhouse) Notes on the gg. *Amycterus* and *Acantholophus*, with descriptions of some new species—p. 75-80. (Baly) Monograph of the Australian species of *Chrysomela*, *Phyllocharis*, &c.; with a plate—p. 170-186, 241-263. (Waterhouse and Janson) On the British species of g. *Stenus*—p. 136-156. A valuable contribution towards the arduous but necessary work of a complete revision of the list of British Coleoptera, encumbered as it is with spurious species and an inaccurate nomenclature. By means of Kirby's MSS. descriptions, which Stephens had abridged and altered for his Illustrations, and of a careful collation of the collections of both, the authors of this essay have arrived at an elucidation of many of the defects and errors of the Illustrations, and have reduced the nomenclature to some degree of method and consistency, according to the desire expressed by Erichson in the preface to the Monograph of Staphylini. (Westwood) Descriptions of various spp. of Pselaphidæ of N. S. Wales and S. America; with two plates—p. 272-280. Fifteen new species are here described, of which five belong to g. *Articerus*, and two to *Metopias*. (Desvignes) *Ichneumon paludator* n. sp., a parasite of different species of Nonagria—p. 44. (Smith) Economy of *Pompilus punctum*, and other Hymenoptera—p. 41-43. (Same) On the genera and species of British Formicidæ—p. 95-135. This careful revision of a difficult family brings up the number of British species to twenty-eight, arranged under six genera. (Same) Descriptions of some Brazilian ants of the genera *Pseudomyrma*, *Eciton*, *Myrmica*, and observations on their economy, by Mr. H. W. Bates; with a plate—p. 156-169. (Desborough) Observations on the Honey-bee; continuation of the Prize Essay for 1852—p. 187-196. (Newman) Notice of a sackbearing Bombyx, *Perophora batesii*, found by Mr. Bates near Santarem; with a plate—p. 1-8. (Same) New Australian Lepidoptera, collected by Mr. Oxley; with a plate —p. 281–300. The species amount to thirty, and three new genera are proposed among the Tineina. (Stainton) Entomological difficulties exemplified in the g. *Elachista*—p. 84-89. (Same) Three new species of Indian Micro-lepidoptera—301-304. (Lubbock) Freshwater Entomostraca of S. America; with a plate—p. 232-240. Two species are added to g. *Cypris*, and to *Daphnia* and *Diaptomus* one each. (Newman) Memorandum on the wing-rays of insects—p. 225-231. (Davy) Observations on the excrement of insects—p. 18-32. List of the officers and members of the Society, Additions to the Library and Collection, Table of Contents of Vol. III.—pp. 24. Journal of proceedings from February, 1854, to January, 1856—pp. 158. General Index—pp. 11.

NOTE ON MR. NEWMAN'S MEMORANDUM ON THE WING-RAYS OF INSECTS.

The author has expressed a desire that Physiology should have some share of the attention of British Entomologists; and with this view he has offered a modest contribution in that department. Concurring with him in the regret that so little has been done for that branch of Entomology, through a society expressly instituted for the cultivation of the science among us, we are more disposed to welcome than to scrutinize severely any contribution intended to redeem them from a reproach. But while any accession to physiological truths may exceed in value the rapidly accumulating descriptions of new species and extemporaneous genera; it follows,

almost necessarily, that errors and false reasoning *here* become in the like proportion detrimental to the cause of the science. In the present instance, we are afraid that Mr. Newman has done little but increase the number of synonymous *terms*, without any material contribution to the knowledge of the things, by this Memorandum The subject of it is stated as being "those familiar portions of an insect's wing, commonly known as nervures or veins." Commencing with a criticism on the variety of names that have been applied to these parts, and on the alleged general neglect to consider their use and function, as the basis for a correct nomenclature, the author goes on to characterize them as "a strong and durable framework, on which the filmy fabric is extended," and states, very truly, that "the framework is the support of the membrane, and at the same time the instrument by means of which its movements are accomplished." Having thus come, as he imagines, to "a conclusion opposite to the received opinions and habitual usages of all (his) Entomological friends," the author gathers courage from contemplating himself in this antithetical position; and he adjudges the objects in question to be "exclusively organs of support, in exactly the same sense as the bones of vertebrates are so considered." Rejecting, accordingly, the terms "veins, nerves," &c., as physiologically inapplicable to these organs, he has illustrated their analogy to the bones of a bat's wing, and concludes—the reader will doubtless suppose—in favour of the term *Pterygostea* (wing-bones) long since proposed by Leach, and "which implies the truth." Not so. Having proved (?) them to be *bones*, *therefore* he decides that, "the simple word *ray*, latinized by *radius*, will be found sufficiently descriptive, and fortunately possesses another claim, that of priority." Having arrived at this climax, we confess we rubbed our eyes a little, to convince ourselves we were broad awake, before we turned the page. But there we found not a word more on the subject—neither reference in support of this last most unexpected assertion, nor explanation, qualification, or note of any sort. Has it, then, been in dreams only, or by second sight, that we have hitherto imagined ourselves to have been familiar with the (newly discovered) motory function of these "ossa innominata,"—for we dare not yet a while entitle them again as we have been accustomed. Have "nerves" and "veins" been mere idola specus, optical illusions, but now obliterated irrevocably from the black-letter pages of medieval twilight by the renascent rays of an elder day? Have Chabrier, Jurine, Audouin, and the rest he has enumerated, but unconsciously accumulated the evidence, the force of which they failed to perceive, and furnished the mere raw materials, out of which it was reserved for a Newman to draw illumination? The question deserves, we think, investigation; and if we can show that the premises are no less faulty than the conclusion appears illogical, we are satisfied that no one will be more ready than the author himself graciously and frankly to abandon the innovation, and to acquiesce in the nomenclature established by age, authority, and usage, and, as we believe, quite as defensible on grounds of reason as that which he has advocated here. For a definition, then, we turn at once to the most trite authority at hand—Illiger's Terminology—where we read of insects, § 1708, "Wing-nerves, Wing-veins, *Alarum Vasa seu Nervi seu Venæ*, the ribs, or vessels, which form the principal fabric of the wing, between which the membrane is fastened." Short as the definition, it is anything but *opposite* to Mr. Newman's own, which we have quoted. Take another description, a little more in detail, from the Course of Lectures on Natural History, delivered in 1772, by the celebrated Adanson. We quote the edition of them, from his own manuscripts, printed at Paris, in 1845, in two volumes 12mo., page 265: "All these different sorts of wings, whether cartilaginous, hard, thick and opaque, or membranous and of the greatest tenuity, are all alike composed of two delicate laminæ, between which run the nervures, which convey nourishment, movement, and life to this part." The remark, a little further down in the same page, about "the internal air propelled through the tracheæ or air vessels, which run alongside of the nerves and nutritive vessels," shows how complete a knowledge of the structure of these organs was possessed by the illustrious botanist. Compare now with this the statement of one of the first of living insect physiologists, Burmeister, in his Manual of Entomology, vol. 3, page 45, concerning "the relation of the horny veins, which serve partly for the tension of the membrane, partly for conveying of the air-tubes, nerves, and currents of blood," and it

will appear, we think, that Mr. Newman's view, (supported and preceded by these quotations, in all but the overstrained exclusive lengths he would push it to,) is neither an original discovery, nor even the revival of a forgotten truth. In regard to the question of priority, not being favoured with any reference for radii, and declining to prove a negative, we can only adduce for the present some positive early authorities for the terms set aside ; subject to correction, if yet an earlier date can be assigned for this particular application of the term Mr. Newman advocates. In Aldrovandus de Animalibus insectis, published A.D. 1602, the *veins* of the wings are repeatedly mentioned, where distinguished by colour, in the Lepidoptera; thus "alæ venis nigris ;"—"septem velut venæ rubicundæ eas [alas] percurrunt;" and again of wasps, he says, "alæ * * * subrubris velut venulis percurrentibus præditæ." Moufet, in his Theatrum Insectorum, published in 1634, but derived in a great part from the MSS. of Conrad Gesner, older by nearly a century, uses the terms *veins* and *nerves* almost indifferently. Thus, of certain Lepidoptera the wings are said to be "nigris quibusdam venulis insignes," and again, "niveis nervulis, &c." While *Chrysopa perla* is described "alis quatuor * * * quarum nervi virescunt." Swammerdam appears in like manner to have used the terms *nerves* or *veins* indifferently : see the description of *Culex* in his History of Insects, (we cannot quote the Dutch original, but the Latin and the French translations are agreed in this) ; although the importance he attributes to their nutritive function—"Hæc vasa per quæ, pro epigenesi facienda, similes particulæ, una cum liquore nutritio, in alas deferuntur"—might seem to imply a preference for the latter term. In Ray's Historia Insectorum the term *nervi* is of more frequent occurrence, though he has repeatedly mentioned *venæ* among the Lepidoptera, to which it had been applied by Petiver also. We conclude our citations, from the writers earlier than Linnæus, with Frisch, who uses the term *veins* invariably, after once suggesting the alternative of *ribs*. Linnæus, who never innovated without necessity, or an adequate motive, retained this use of the term *veins*, or the more general one of *vessels*, also employed by preceding writers, while Degeer has preferred that of *ribs*. The French authors, Reaumur, &c., writing in their own tongue, introduced *nervures ;* which Olivier thus employs interchangeably for the Latin *venæ*. But neither the French *nervures*, nor the Latin *nervi*, were chosen with any reference to the restricted sense of nerves, in modern anatomy, as organs of sensation. A reference to the Dictionary of the Academy will show that the former term is strictly one of art, denoting in bookbinding the raised *cords* of the backs of books, and in architecture *mouldings ;* while the application of the latter is to be derived from the usage of the Greek and Latin, as living tongues, when it was applied more indiscriminately, yet chiefly to the sinews, and hence to bow strings also. That such was the origin of its use, in reference to the wings of insects, may be inferred, negatively, from the date of that application preceding any record of the physiological theory with which Mr. Newman connects it ; and positively, from the similar use of the term nerves, as well as veins, in the leaves of plants, where the idea of sensitive organs surely was not entertained. (Linnæi Philosophia Botanica, lxxxiii. 66, 67.) Indeed, the analogy between these vessels and the veins in the wings of insects, as regards their distribution and connection, is often very striking. This may be corroborated by the early renderings of the Latin *nervus*, which Brunnich in Linnean times translated by Sene (*Sinew*), and Harris not much later by *Tendon*. As Newman, after arguing from analogy for the term *bones*, has concluded by waiving that in favour of another name, we need not labour here to prove, that if the vessels in question be not "veins" in the most exclusive and restricted sense, which no one probably supposes them to be, yet no ambiguity can arise from this long established application of the term in insects, which have no system of veins in the former sense, while the analogy to the bones of the Vertebrata is subject to quite as much limitation, and the expression of it is not in like manner supported by familiar usage. But with regard to the preference given to the favoured *radii*, we may observe that it stands on bare grounds of novelty, at least until some other evidence of former usage shall have been produced ; that there is a patent ambiguity in the application proposed, inasmuch as the same term has been long since appropriated to a different division of the wings of insects (see Illiger's Terminology § 1700) ; and further, that the term does not express the analogy to

the bones of the Vertebrata insisted on; *radius*, in the singular only, being specially applied to a single bone of the arm; here, as in the case of the radii of the fins of fishes, the allusion being to the primitive sense of the word, a *rod*, pole, spoke—which notion of straightness and simplicity, finally, is inapplicable in the great majority of cases to the complete connection and multiplied ramification of the vessels in the wings of insects; while this condition is very aptly expressed in Entomology, as in Botany, by reference to the analogy of "veins," a system long since characterized by Aristotle on those very grounds of distinction.

Hooker's Journal of Botany, and Kew Garden Miscellany. No. 87, April; No. 88, May; No. 89, June, 1856. 8vo. London: Lovell Reeve. With a Plate, price 2s. each.

No. 87, April:—(Dr. Morro) Notes on the vegetation of the Middle Island of New Zealand. (Rev. C. Parish) Letters on the Botany of Moulmein. The Mammoth Tree. The Plants of the Bourgean, collected in Teneriffe. The late Mr. David Douglas; Mr. Veitch. Notices of De Candolle's Resumé of Botanical Geography, the Art of Perfumery, and the British Ferns nature printed.

No. 88, May:—(Rev. M. J. Berkley, A.M.) Decades of Fungi. (Dr. F. Mueller) Definitions of rare, or hitherto undescribed Australian Plants. The Mammoth Tree. The portion of this tree brought to England consists of sections of the bark, from 18 to 22 inches thick, taken from the trunk, 40 feet from the base. The bark is placed nearly in situ, forming a room some 20 feet wide. The whole tree, still standing on its native mountains, measures 327 feet in height, and 90 feet in circumference. The bark is a rich cinnamon brown, not unlike that of some of our Scotch pines. Notices of Books.

No. 89, June:—(F. Mueller, M.D.) Definitions of rare, or hitherto undescribed Australian Plants. (M. J. Berkley, Clk., M.A., F.L.S.) Decades of Fungi; Decades, 55, 56 (with plates v., vi., ix., and x.), Rio Negro Fungi (continued from p. 143). Botanical Information—Mr. Spruce in Peru. An idea of the difficulties this energetic traveller has had to contend with may be had from the fact that it cost him one whole month to make two boxes and prepare the boards for two others. This even surpasses the labours of Robinson Crusoe. Notices of Books.

The Phytologist. A Botanical Journal. Published Monthly. 8vo. London: W. Pamplin. With Plates. New Series. No. 12. April; No. 13, May; No. 14, June, 1856. Price, 1s.

No. 12, April:—(George Jorden) On the Botany of Wyre Forest and surrounding part of the country. (W. L. Lyndsay, M.D.) The Economical Application of British Lichens. This is a very interesting paper. We hope the study of British Lichens will soon become a favourite one; for there is a wide field of investigation amid this lowly race of plants, and but few labourers in it. (W. A. Leighton) On the impregnation of Vaucheria Sessilis. On some uncommon plants observed in the neighbourhood of Tunbridge Wells, in 1855. Notices of Books. Botanical Notes. Notices and Queries, &c. Descriptive British Botany. Eight pages.

No. 13, May:—A list of Common Plants. Diagnostics of Polystichum aculeatum and angulare, with illustrations. (J. G. Baker) On the Hieracia of North Yorkshire and Teesdale. (T. W. Gissing) Botanical Notes from East Suffolk. (J. G. Baker) A few words on our indigenous Barlareæ. Reviews, Botanical Notes, &c.

No. 14, June:—(J. S. Mill) Plants growing wild in the district of Swiford's Riegate Flora, but not included in that work. (J. Lloyd) On the Sorb tree of Wyre Forest. (A. G. More, F.L.S.) On some uncommon Plants observed at or near to Tunbridge Wells in 1855. (John Windsor, F.L.S.) Plants found near Settle, Yorkshire. (George Jorden) Some account of the Botany of Wyre Forest and surrounding parts of the country. (W. Cheshire) On Anacharis Alsinastrum. Reviews, Botanical Notes, &c.

THE NATURALIST: a popular Monthly Magazine, with numerous Engravings; conducted by Rev. F. O. Morris, B.A. No. 62, April; No. 63, May; No. 64, June, 1856. 8vo. Price 6d. each. London: Messrs. Groombridge.

No. 62, April:—(O. S. Round) The Voices of Birds. (Rev. F. O. Morris) A Chapter on Instinct. (W. V. Guise) A Day's Conchologizing on the Islet of Herm. (W.) A Second Medley. (J. H. Davies) Three Days in Caernarvonshire. (T. Edward) Moth Hunting; or an Evening in a Wood.—Leaf I. (The Editor) Systema Naturæ. Miscellaneous Notices.—Anecdote of a Horse; Two Eagles Shot; The Little Bustard; The Blackstart; Flight of Martins; Scarcity of Birds; Occurrence of the Great Plover and Spotted Crake, in Devon; The Ring Ouzel; Occurrence of Rare Birds; English Names for Butterflies and Moths; Callimorpha Hera; A Christmas Novelty; Late Blossoming of the Laburnum. Retrospect.—The "Great Unknown" Hawk. Reviews.—The Entomologist's Annual. Rustic Adornments, for Homes of Taste; by Shirley Hibberd. Proceedings of Societies.—The London Working Entomologists' Society.

No. 63, May:—(O. S. Round) Characteristics of Common Birds. (E. S. Walker) Down the River. (T. Edward) Moth Hunting; or an Evening in a Wood.—Leaf II. (Taxus) Hints to Insect Collectors. (W. V. Guise) A Day's Conchologizing on the Islet of Herm. (The Editor) Systema Naturæ. Miscellaneous Notices.—Peregrine Falcon; Great Bustard; Common Bittern; Eider Duck; Spotted Crake; Common Scoter; Common Crossbill; Scarcity of Birds about Richmond; Myrtle Bee; Malformation of Plantago lanceolata. Review.—Taxidermy made Easy; being Plain and Practical Directions for Preserving, Setting up, and Embellishing in the most approved style, all kinds of Quadrupeds, Birds, Fishes, Reptiles, Insects, &c.; with Notes and Illustrations. By John Tyrer, Taxidermist. Proceedings of Societies.—The London Working Entomologists' Society. The Querist—Hips and Haws.

No. 64, June:—(F. M. Burton) Extracts from Correspondence with a Brother Naturalist. (Pass Balshaw) Amateur Naturalists. Inquiry for the Naturalist (with Engraving). (Taxus) Hints to Insect Collectors. (J. H. Davies) Notes on the Bryology of Ladhill Gill, North Yorkshire. (R. G. Schofield) Design for a New Larva Box; with Engravings. (Emily E. Harrison) List of Cryptogamous Flora found in the neighbourhood of Ripon, Yorkshire. (The Editor) Beginning of the Hunting Season. Miscellaneous Notices.—Snow Bunting; Bewick's Swan; Mealy Redpole; Golden-eye; Early Breeding of the Dipper; The Cornish Chough; Common Frog. The Retrospect.—The "Great Unknown" Hawk; Microscopes. Proceedings of Societies.—The London Working Entomologists' Society. The Querist.—Why are Birds so scarce in certain districts, &c. ?

SWEDEN.

GOETHEBORGS KONGLIGA VETENSKAPS OCH VITTERHETS SAMHAALLES HANDLINGAR. Ny Tidsfjoeld. TRANSACTIONS OF THE R. GOTTENBURG ASSOCIATION OF SCIENCE AND LITERATURE. New Series. 8vo. Part III. Goetheborg. 1855.

(Malm) Malacological contribution to the Scandinavian Fauna; with a plate —p. 1-47. (Same) Description of a species of the family Circinæ, not previously found in Scandinavia—p. 49-55. (Same) On the land and freshwater Mollusca of Sweden, with reference in particular to the species and forms that occur in the vicinity of Christianstad and Goetheborg; continued and concluded—p. 73-152.

GERMANY.

VERHANDLUNGEN DES ZOOLOGISCH—BOTANISCHEN VEREINS IN WIEN. TRANSACTIONS OF THE ZOOLOGICAL AND BOTANICAL ASSOCIATION OF VIENNA. 8vo. Vienna. Vol. V.; with nineteen Plates. 1855.

ZOOLOGY.—(Lederer) *Grapholitha hornigiana*, n. sp.—p. 78-80. (Dorfmeis-

ter) On Zygænæ which occur in Styria; continued—p. 87-96. Concludes that E. peucedani, athamantæ, ephialtes, falcata, trigonellæ, æacus, coronillæ, are varieties of one species, and that E. erythrus is probably not specifically distinct from E. minos. (Lederer) Addition to the Lepidopterous Fauna of the Altai mountains in Siberia; with two plates—p. 97-99. (Hornig) Metamorphosis of Cochylis posterana (ambiguana Tr.) rubellana, dubitana—p. 129, 130. (Lederer) Contribution to the Lepidopterous Fauna of Cyprus, Beyrout, and part of Asia Minor; with five plates—p. 177-254. The warmth of the climate promotes the development of the tails of the hinder wings of some of the Lycænidæ. The same is observed in the summer brood of *Polyommatus thersamon*, compared with the spring brood. Some of the species in Klug's Symbolæ Physicæ, founded on such differences, fall accordingly. (Mann) Lepidoptera collected in Corsica—p. 529-572. With descriptions of many new Microlepidoptera and a few Geometræ. (Kollar) On the destruction of Rye in granaries by the caterpillar of *Apamea basilinea*; with a plate—p. 697-700. (Lederer and Mann) Three new Austrian Lepidoptera, *Psyche ecksteini*, *Ps. zelleri*, *Tortrix aurofasciana*; with a plate—p. 755-758. (Egger) New Austrian Diptera, *Stichopogon frauenfeldi*, *Mochtherus schineri*, *Lophonotus tridens*—p. 5-9. (Same) On the variable veining of the wings in certain Diptera—pp. 9-12. (Schiner) *Nemotelus signatus* n. sp. from Hungary; figured—p. 81, 82. (Loew) Remarks on the genus Sargus—p. 131-148. The following new names of groups are proposed, *Analcocerus*, divided from Eudmeta by the 8-jointed antennæ, the species Brazilian, one new; *Ptecticus*, type *S. testaceus* F., four new species described; *Merosargus*, type *S. obscurus* Wdm., two new species; *Chrysonotus*, type *S. bipunctatus* Scop.; *Michrochrysa*, for the smaller species of Chrysomyia with nearly naked eyes. (Schiner) List of Austrian Diptera; No. II. Stratiomydæ and Xylophagidæ—p. 613-682. (Loew) On the g. Eumerus—p. 687-696. (Mayr) Formicina Austriaca, or Descriptions of the Ants of Austria, Germany, Switzerland, and Italy; with a plate—p. 273-478. Of European Ants there are enumerated one hundred and nine, viz.: of *Formicidæ*, Formica 41 species; Tapinoma 5; Hypoclinea n. g. 2, type *F. quadripunctata* L.; Monocombus n. g. 1, *F. viatica* F.; Cataglyphus 1; Polyergus 2; *Poneridæ*, Ponera 3; Odontomachus 1; *Myrmicidæ*, Myrmica 9, Formicoxenus 1; Myrmecina 1; Tetramorium n. g. 3, type *F. cæspitum* L.; Strongylognathus 1; Stenamma 2; Leptothorax n. g. 13, type *M. acervorum*; Diplorhoptrum n. g. 1, *F. fugax* Ltr.; Monomorium n. g. 1, minute new Ant from Italy; Oecophthora 1; Atta 3; Aphænogaster 2; Crematogaster 2; and thirteen species of uncertain position. Eighty-four species are here very minutely described, and a particular nomenclature of the wing-ribs and cells is given, illustrated with figures. (Brauer) On the metamorphosis and internal anatomy of the Neuroptera; with a list of the species found about Vienna; with six plates—p. 479-484, 701-726, 777-786. The natural history of the following species is illustrated:—Ascalaphus macaronius, Mantispa pagana, Boreus hyemalis, Formicaleo tetragrammicus, Acanthaclisis occitanica. In the general view of the anatomy, Hagen's statement that *Sisyra* possesses only six malpighian vessels is admitted, doubtfully, as one exception to the general rule of eight in the family. The doubt is justified; there are eight both in the perfect insect and the larva (the well-known "Spongilla animalcule"). The number is six in *Coniopteryx*, both the perfect insect and larva, of the anatomy of which genus no account is here given. (Hampe) *Rhacopus*, n. g. of Eucnemidæ, allied to Tharops; *Rh. cinnamomeus*, found near Sebenstein—p. 255, 256. (Miller) Insects from the Carynthian caves—p. 505-508. *Machærites*, n. g. of Pselaphidæ; *M. spelæus* figured; three new species of *Adelops*; making ten known European species of this genus, the characters of which are here briefly given. (Haimhoffen) On an excrescence of the root of Alyssum incanum L., and the insect that produces it—p. 525-528. The insect of this gall is *Ceutorrhynchus sulcicollis* (see Proc. 128), which is infested by a Hymenopterous parasite, *Taphæus conformis*. (Guérin-Méneville) Catalogue of the Coleoptera collected by Mr. Gaetano Osculati on the banks of the Napo and Amazon rivers—p. 573-612. (Gobanz) On the coleoptera of the Steiner-Alps and the Vellach-thal, in Caryntbia—p. 733-754. (Schmidt) Two new cave ani-

mals, a beetle, *Adelops milleri*, and a mollusk, *Helix hauffeni*—p. 3, 4. (Frauenfeld) Galls produced by insects, observed in Dalmatia and Egypt—p. 13-22, 149-152. (Strobel) List of terrestrial Mollusca collected in the Tyrol—p. 153-166. Botany —(Neilrich) History of Botany in Lower Austria—p. 23-76. (Kerner) On the influence of the temperature of springs on the plants growing about their channel—p. 83-86. (Roell) Occurrence of truffles—p. 121-124. (Ortmann) On *Heleocharis carniolica*, Koch., and *Carex ornithopodioides* Haussin—p. 125-128. (Kerner) On the native names of plants in Lower Austria—p. 257-272. (Reichardt) Supplement to the Flora of Iglau—p. 485-504. (Reissek) Contribution to the Flora of Vienna—p. 511-514. (Roell) Contributions to the Cryptogamous Flora of Lower Austria—p. 515-520. (Kerner) The Jauerling; a sketch of Botanical Geography—p. 521-524. The Jauerling is the highest point of the southern outlying range of the mountains between Bohemia and Moravia. The name, otherwise "Javornick," seems to be derived from the sycamore trees, in slavish "Javor," of which there are groups of great age, on the eastern declivity in particular. (Kalkbrenner) Contribution to the Flora of the Quarter under Manhartsberg—p. 683-686. (Tomaschek) Contribution to the Phanerogamous Flora of the immediate environs of Cilly—p. 759-764. (Hazslinszky) Contribution to the Flora of the Carpathians—p. 765-776. (Kerner) Flora of the cottage gardens of Germany—p. 787-826. An essay illustrative of the cultivated plants designated by Latin names in the Capitulare de villis, &c., of the Emperor Charlemagne.

Proceedings, pp. 132.—(Mayr) On the variability of the wing-veins in Ants—p. 8. (Brauer) *Podurœ* on snow—p. 22. (Frauenfeld) Notes of his travels in Egypt and the coasts of the Red Sea—p. 38. (Finger) Occurrence in Austria of *Strix uralensis*, and on its peculiar note—p. 54. (Kner) On *Murœnophis*, and on the peculiar mobility of the dorsal fins of *Hippocampus*—p. 57. (Schiner and Egger) On the character of the Fauna of the Neusiedler See—p. 65, 74. (Hoernes) Abstract of the ninth part of the "Fossil Mollusca of the Tertiary basin of Vienna"—p. 86. (Mahler) Occurrence of *Filariæ* in insects—p. 76. (Tomaschek) *Nycteribiæ* found on Bats from the Adelsberg Grotto—p. 79. (Dolleschal) Notes of a residence in Java, and on the medical practice of the natives—p. 111. (Zhishmann) On the "milk-sickness" in the slave states of North America—p. 117. (Schiner) Notes on the Flora of the Manhartsberg—p. 130. Entomological Society of Silesia, invitation to institute observations of periodical phenomena in the insect world—p. 97. List of Members, &c.

Archiv des Vereins der Freunde der Naturgeschichte in Mecklenburg. Archives of the Association of Naturalists in Mecklenburg. Part IX. 8vo. New Brandenburg 1855.

(Halm) Report of the ninth Meeting of the Association at Guestrow, the 30th of May, 1855—p. 1-11. (Fiedler) Synopsis of the Fungi of Mecklenburg; a letter bearing date 1793—p. 30-39. (Brueckner) Observations on the variations of some Fungi Pileati—p. 40-49. (Fueldner) Synopsis of the Odonata, or Libellulæ, of Mecklenburg—p. 49-70. (Kade) Sketch of the Diluvian drift containing petrifactions, in the environs of Meseritz—p. 80-94. (Boll) Minor Geognostical communications—p. 104-106. (Boll) Ernst Von Berg's achievements in Natural History; a biographical sketch—p. 106-116. (Clasen) Synopsis of the Coleoptera of Mecklenburg; an Appendix to the first article in Part VIII.—p. 116-157. (Boll) Second Appendix to the Catalogue of the Lepidoptera of Mecklenburg—p. 158-161. (Same) Conchyliological notes—p. 158-165. (Vogt and Wagner) Letter to Boll—p. 163-179. Miscellanies—p. 108-190. Literature—p. 191. Invitation to institute observations on the periodical phenomena of the Insect world—p. 192-197.

Abhandlungen der Mathematisch-Physischen Klasse der K. Saechsischen Gesellschaft der Wissenschaften. Transactions of the R. Saxon Society of Science. Math. Phys. Class. 4to. Leipzig.

Vol. II., with nineteen Plates. 1855.

Contains only one article in Natural History. (Hofmeister) Contribution to the history of the Vascular Cryptogamia; with eighteen plates—p. 121-179.

ZEITSCHRIFT FUER DIE GESAMMTEN NATURWISSENSCHAFTEN herausgegeben von dem Naturwissenschaftlichen Vereine fuer Sachsen und Thueringen in Halle. JOURNAL OF THE NATURAL SCIENCES in general, published by the NATURAL HISTORY ASSOCIATION OF SAXONY AND THURINGIA. 8vo. Halle. Vol. V. 1855.

Original essays. (Andræ) The fossil plants of the Tertiary formation of Szakadal and Thalheim in Siebenburgen, and of the Lias of Steindorf in the Bannat—p. 201–207. (Giebel) Crinoids in calcareous marl at Quedlinburg; with a plate—p. 25-33. (Same) The osteology of the land-rail and some allied species—p. 185-200. (Same) The question of Races, or Species, of Dogs—p. 349-362. (Koehler) On the chemical composition of the fluid out of a "Spavin"—p. 437–442. (Luetken) Contributions to the history of the Ophiura 1. Preliminary synopsis of the Ophiura of the Greenland seas; communicated by Creplin—p. 97-107. (Martin) On the specific distinction of *Anagallis phœnicea* and *A. cœrulea* —p. 433-436. (Nitzch) Historical sketch of the study of Epizoic insects—p. 269-287. (Schmidt) On the ribbon-worm of the frog, *Tœnia dispar*, and the non-sexual propagation of its proglottis; with two plates—p. 1-12. (Soechting) On Paragenesis of minerals—p. 288-298. (Steenstrup) A new tropical species of the genus *Corymorpha*, *C. januarii*—p. 108-110. (Thorell) On the male of *Scytodes thoracicus*—p. 363-365.

Short Communications. (Albini) Nutritive value of the chesnut, *Castanea vesca*—p. 124-127. (Andræ) Two new species of fruits from the Carboniferous strata of Saarbruecken—p. 43-45. (Creplin) Reinhardt's observations on phosphoric light in a fish, and in an insect larva—p. 208-211. (Giebel) Critical notes on the Myophoria of the Muschel-kalk—p. 34-37. (Same) Osteological differences of the Bullfinch, Greenfinch, and Crossbill—p. 37-43. (Same) New *Byrrhus* from Thuringia—p. 127. (Same) Osteology of the Porcupine—p. 306-316. (Same) On a hybrid of the swan and goose—p. 444. (List) Remarks on Ulrich's essay on the *Mysi* from the Rammelsberg—p. 369. (Nitzch) The intestinal canal of *Salmo lavaretus;* with a plate—p. 316. (Soechting) Mineralogico-paleontological notes—p. 370. (Same) On a boring for rocksalt in the Johannisfeld near Erfurt—p. 443.

Reviews and Literary Notices. These are so numerous that we have not space to give the headings of them. They extend to one hundred and twenty articles in Mineralogy, Geology, and Paleontology; as many in Zoology; and upwards of forty in Botany.

ABHANDLUNGEN DER NATURFORSCHENDEN GESELLSCHAFT IN HALLE. TRANSACTIONS OF THE NATURAL HISTORY SOCIETY OF HALLE. 4to. Halle.

Vol. II. Part 4. 1855.

(Zuchold) Catalogue of Botanical works, omitted in Pritzel's Thesaurus—p. 66-74. Proceedings—p. 23-66.

Vol. III. Parts 1 and 2. 1855.

(Leichardt) Contribution to the Geology of Australia; with two plates—p. 1-62. (Irmisch) Contributions to the comparative Morphology of plants, V.; the Germination, Growth, and Reproduction of a series of indigenous plants of the order Labiatæ; with two plates—p. 60-106. Proceedings, 1st and 2nd Quarter of 1855—p. 1-10, 11-30.

BELGIUM.

MEMOIRES COURONNES DEL'ACADEMIE ROYALE DES SCIENCES DE BELGIQUE, et Memoires des Savans Etrangers. PRIZE ESSAYS OF THE ROYAL BELGIAN ACADEMY OF SCIENCE, ETC. 4to. Brussels. Vol. XXVI. 1855.

(Lieberkuhn) Development of the *Gregarinæ;* with eleven plates—pp. 46. (Udekem) Natural History of the *Tubifex* of the rivers; with four plates—pp. 38.

FRANCE.

ANNALES DES SCIENCES NATURELLES. ANNALS OF NATURAL SCIENCE, ETC. Fourth Series. 8vo. Paris.

ZOOLOGY. Vol. IV.; with eleven Plates. 1855-1856.

PHYSIOLOGY.—(Gibb) On the assimilation of sugar—p. 27-47. (Figuier) Saccharific function of the liver—p. 91-109. (Bernard) Mechanism of the formation of sugar in the liver—p. 109-119. (Lehmann) On the presence of sugar in the blood of the Vena-porta—p. 158-171. (Moleschott) On the influence of light on the production of carbonic acid in animals—p. 207-224. (Longet) The Sulphocyanide of potassium as one of the normal elements of saliva—p. 225-237. (Dareste) Partial application of a varnish to the shell of the egg; its effects on the development of the chicken—p. 119-128. VERTEBRATA.—(Jacquart) Organs of circulation in the serpent *Python;* with three plates—p. 321-364. (Thomas) On two European species of frogs, *Rana agilis and R. oxyrrhina;* with a plate—p. 365-380. (Hollard) Monograph of the Balistidæ, concluded; with a plate—p. 5-27. (De Serres) On a vomer furnished with five rows of teeth, from the Chlorite limestone; referable, perhaps, to the *Pycnodus rugulosus;* with a figure—p. 264-266. ANNULATA.—(Fabre) On the habits of *Cerceris*, and the cause of the long preservation of the Coleopterous insects stored up for the food of their larvæ—p. 129-150. (Dufour) Remarks on *Cerceris*—p. 261-263. (Same) On the absence of any perceptible nervous system in *Nemoptera lusitanica*—p. 153-158. (Same) Additions to the preceding note—p. 263, 264. (Beauvoye) On the habits of the hive-bee—p. 151-153. (Lespès) Second note on the Spermatophora of *Gryllus sylvestris;* with figures—p. 244-249. (Faivre) Histology of the great Sympathetic in the medicinal Leech; with figures—p. 249-261. (Siebold) On the Nematoid and Vesicular worms of man and animals, *Tænia*, *Cysticercus*, &c., and on the origin of worms in general; with two plates—p. 48-90, 172-208. (De Serres) On *Stoa*, a new boring genus of Annellida; with figures—p. 231-243. (Shuttleworth) Remarks on the preceding paper—p. 319, 320. Suggesting doubts as to the nature of the productions in question. Similar tubes have been described long since, but have been classed with the Mollusca. MOLLUSCA.—(Lacaze Duthiers) On the organ of Bojanus in the Acephala Lamellibranchiata; with three plates—p. 287-319. (Same) On the Hermaphroditism of the *Anodontes*—p. 381, 382.

BOTANY. Vol. IV.; with nineteen Plates. 1855-1856.

BOTANY GENERAL AND PHYSIOLOGICAL.—(Naudin) On the nature of the tendrils, and the structure of the flower, in the Cucurbitaceæ; with two plates—p. 5-19. (Boussingault) Effects of saltpetre on vegetation—p. 32-47. (Schacht) Development of the Embryo of *Tropæolum majus;* with two plates—p. 47-58. (Deeche) New observations on the development of the Embryo of *Pedicularis sylvatica;* with two plates—p. 58-64. (Tulasne) New studies of vegetable embryogeny; with twelve plates—p. 65-122. (Fabre) Inquiry into the cause of the phosphorence of the Agaric of the Olive—p. 179-197. (Jordan) On *Aegilops triticoides*, and the questions of Hybridity and specific variability connected with its history—p. 295-361. SPECIAL BOTANY.—(De Candolle) On the family *Myristicaceæ*—p. 20-31. (Desmazières) Twenty-third note on the Cryptogamous plants lately discovered in France—p. 123-132. (Planchon) On Hermodactyles, considered botanically and medicinally; with a plate—p. 133-175. (Asa Gray) Five new genera of plants from Polynesia; *Acicalyptus*, Myrtaceæ; *Spiræanthemum*, Saxifragaceæ; *Reynoldsia*, *Tetraplasandra*, *Plerandra*, Araliaceæ—p. 176-178. (Clos) Monograph of the family *Flacourtianeæ*—p. 362-387. MISCELLANEOUS.—(Cosson) Botanical expedition in Algeria—p. 198-294.

ANNALES DE LA SOCIETE ENTOMOLOGIQUE DE FRANCE. ANNALS OF THE ENTOMOLOGICAL SOCIETY OF FRANCE. 8vo. Paris. Third series. Vol. III., with twenty-four Plates. 1855-1856.

(Macquart) Diptera of Europe; Tachinariæ concluded; with four plates—

p. 20-41, 177-208. The genera Hypostena, Aculocera n. g. (Ancylocera), Gymnostylina n. g., Uromyia, Medoria, Nyctia, Calobatemyia n. g. Morinia, Microsoma n. g., Clista, Peteina, Fallenia, Tryphera, Plesioneura n. g., Anthracia, Microcheilosia n. g., Rhinophora, Leucostoma, Scopolia, Brachystylum n. g., Plesina, Melanophora. (Milliere) A variety of *Catocala electa;* figured —p.167-175. (Constant) Varieties of *Orthosia gothica;* with figures—p. 209, 210. (Graslin) *Heliothis maritima*, n. sp; figured—p. 65-74. (Stainton) On a larva which mines the leaves of the vine; with figures of *Elachista treitskiella*, its larva, &c.—p. 211-213. (Coquerel) On the silk worms of Madagascar *Bombyx radama*, *diego*, *panda*, and on *Chilo carnifex*, a destroyer of them—p. 529-534. (Bureau) On the capture of Noctuæ by sugaring—p. 215-224. (Signoret) Iconographical revision of the Tettigonidæ, concluded; with five plates—p. 49-60, 225-240, 507-528, 765-836. (Same) *Leptolobus murrayi* n. g., n. sp. of Asopidæ; figured—p. 65-74. (Lucas) Sexual organs of the Orthoptera a criterion of their perfect or imperfect state—p. 759-764. (Steuart) *Carabus cœlestis*, n. sp. from China; figured—p. 75, 76. (Buquet) *Sternotomus Thomsoni*, n. sp. from Madagascar; figured—p. 77, 78. (Rouzet) *Sophrorrhinus duvernoyi*, n. g., n. sp. of Curculionidæ from the Gabon; figured—p. 79-82. (Marseul) Monograph of the Histeridæ, continued; with seven plates—p. 83-165, 327-506, 677-758. The genera Carcinops, Paromalus, Monoplius, Pelorus, Scapomegas, Notodoma, Hetaerius, Dendrophilus, Tribalus, Sphærosoma, Saprinus. (Cussac) Metamorphosis of Ceutorrhynchus raphani and Mycetochares linearis, economy of Hydrobius fuscipes; with figures—p. 241-248. (Lucas) Metamorphosis of Tribolium castaneum; figured—p. 261, 262. (Rojas) *Hyperantha vargasi*, n. sp. of Buprestidæ; figured—p. 261, 262. (Salle) New Coleoptera of St. Domingo, with a plate—p. 263-272. (Perris) Notes on Spanish species of Chasmatopterus—p 273-285. (Reiche) Remarks on the same—p. 285-288. The variety of *Melolontha hirtula* Ill. with black elytra, is the female of *Ch. villosulus* Ill., differing from the male both in the colour and more dense pubescence of the elytra. *Ch. hispidulus* Graells is identical with *Mel. hirtula* Ill. the typical form; and *Ch. parvulus* Graells with *Mel. pilosula* Ill. (Saunders and Jekel) New Curculionidæ from N. Hebrides and Lord Howe Island; Hybomorphus n. g.; with a plate—p. 289-306. (Fairmaire) Corrections and descriptions of new Coleoptera of the Mediterranean Fauna—p. 307-322. (Lucas) Monograph of the g. Hybalus—p. 535-560. (Reiche and De Saulcy) New and rare Coleoptera collected by Mr. De Saulcy in his travels in the East; with a plate—p. 561 646. (Jacquelin Du Val) The Bembidia of Europe; supplementary notes and reply to the criticism of Dr. Schaum—p. 647-676. (Coquerel) Notes on the insects of Madagascar; Part IV. The species of Oryctes, and two species of *Scolia* (*oryctophaga* and *carnifex*), which live upon their larvæ; with a plate—p. 167-175. (Dufour) *Epeira thomisoides* and *Theridion ardesiacum*, n. spp. of Araneidæ; with figures—p. 4-14. (Lucas) *Mygale luctuosa* n. sp.; figured—p. 15-20. (Amyot) Biographical notice of M. Fischer de Waldheim —p. 323-325. BULLETIN—pp. CXVI. (Lucas) *Hetærius punctulatus* n. sp. —p. iii. (Signoret) Two new species of Fulgoridæ—p. iv. (Bellier de la Chavignierie) On *Arge titea*—p. xiii. (Bureau) Simultaneous appearance of swarms of *Plusia gamma* and *Botys hybridalis*—p. xvi. (Jekel) Identity of *Barypeithes rufipes* Du Val and *Cmias sulcifrons*, Sch., and thoughts on the classification of Curculionidæ—p. xxvi. (Lucas) *Micipsa* n. g. of Melanosoma —p. xxxv., xxxvii. (Lespés) Habits of *Lomechusa paradoxa*—p. li. (Azambre) Habits of *Ptinus* 6—*pustulatus*—p. lii. (Bureau) Tenacity of life in the reproductive organs of Lepidoptera—p. lx. (Azambre) Disease of leaves of Lime tree, caused by Acari—p. lxii. (Fairmaire and Perris) New Coleoptera of France—p. xxx., lxxv., lxxvii. (Doumerc and Sichel) *Acœnites perlæ* a parasite of Hemerobius perla—p. lxxxi, lxxxvii. (Sallé) Notes of his travels in Mexico—p. lxxxiv. (Amyot) Identity of the Hessian fly of N. America with the European *Cecidomyia tritici*—p. civ. (Azambre) Physiological observations on the larvæ of *Catocala fraxini*—p. cviii. (Brisout De Barneville) *Acridium petræum*, n. sp. of the environs of Paris—p. cxiv. List of Members, &c.

GREAT BRITAIN.

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY OF LONDON. 4to.

Vol. CXLIV. 1854.

Researches on the Impregnation of the Ovum in the Amphibia, and on the early stages of Development of the Embryo. Third Series. By the late George Newport, F.R.S., F.L.S., &c., selected and arranged from the author's MSS., by George Viner Ellis, Professor of Anatomy in University College, London—p. 229–244. On the functions and structure of the Rostellum of *Listera ovata*. By J. D. Hooker, M.D., F.R.S., &c.; with a plate—p. 259–263. An account of the Organic Chemical Constituents or immediate principles of the Excrements of Man and Animals in the healthy state. By W. Marcet, M.D., F.C.S.—p. 265-283. On the frequent occurrence of Indigo in Human Urine, and on its Chemical, Physiological, and Pathological Relations. By Arthur Hill Hassal, M.D., Member of the Royal College of Physicians, &c.—p. 267-310.

Vol. CXLV. 1855.

An account of some recent researches near Cairo, undertaken with the view of throwing light on the Geological History of the alluvial land of Egypt. Instituted by Leonard Horner, Esq., F.R.SS.L. and E., F.G.S.—p. 105-138. Observations on the Respiratory Movements of Insects. By the late William F. Barlow, F.R.C.S. Arranged and communicated by James Paget, F.R.S.—p. 139-148. On the structure of certain Limestone Nodules enclosed in seams of Bituminous Coal, with a description of some Trigonocarpons contained in them. By Joseph Dalton Hooker, M.D., and Edward William Binney, Esq.; with two plates—p. 142-157. On the Development of Striated Muscular Fibre in Mammalia. By William S. Savory, Tutor and Demonstrator of Anatomy of St. Bartholomew's Hospital, Medical College—p. 243–258. On the Anatomy of *Nautilus umbilicatus*, compared with that of *N. Pompilius*. By John Denis Macdonald, R.N., Assistant Surgeon of H.M.S.V. Torch, tender to H.M.S. Herald, Captain H. M. Denham, R.N., F.R.S., commanding the Expedition to the S. Seas, with two plates—p. 277-288. Remarks on the Anatomy of *Macgillivrayia pelagica* and *Cheletropis huxleyi* (Forbes), suggesting the establishment of a New Order of Gasteropoda. By John D. Macdonald, Assistant Surgeon of H.M.S. Herald; with a plate—p. 289-293. Further observations on the Anatomy of *Macgillivrayia*, *Cheletropis*, and allied genera of Pelagic Gasteropoda. By John D. Macdonald, R.N., Assistant Surgeon of H.M.S.V. Torch; with a plate—p. 295–297. On the Megatherium (*M. Americanum*, Cuvier, and Blumenbach) Part II. Vertebræ of the Trunk. By Professor Owen, F.R.S., &c.; with eleven plates—p. 359–388. On Rubian and its products of Decomposition. By Edward Schunk, F.R.S.—p. 389-419.

PROCEEDINGS OF THE ROYAL SOCIETY. Vol. VII. 8vo. London, 1854–1855.

On the Growth of Land Shells; by E. J. Lowe, Esq., F.G.S., F.R.A.S.—p. 8. On a new and more correct method of determining the Angle of Aperture of Microscopic Object-glasses; by W. S. Gillet, M.A.—p. 16. On an indication of depth of Primeval Seas, afforded by the remains of colour in Fossil Testacea; by Edward Forbes, F.R.S., Pres. G.S., &c.—p. 21. On the Structure and Affinities of *Trigonocarpon* (a fossil fruit of the Coal-measures); by Joseph D. Hooker, M.D., F.R.S.—p. 28. On a peculiar arrangement of the Sanguiferous System in *Terebratula*, and certain other Brachiopoda; by W. B. Carpenter, M.D., F.R.S.—p. 32. On the changes produced in the Blood by the Administration of Cod-liver Oil and Cocoa-nut Oil; by Theophilus Thompson, M.D., F.R.S.—p. 42. On the Relation of the Angular Aperture of the Object-glasses of Compound Microscopes to their penetrating power, and to Oblique light—p. 60. Examination of the Cerebro-spinal Fluid; by William Turner, Esq.—p. 89. On the Oxidation of Ammonia in the Human Body; by H. Bence

Jones, M.D., F.R.S.—p. 94. On the structure of certain Microscopic Test-objects, and their action on the transmitted rays of Light; by Charles Brooke, M.A., F.R.S.—p. 139. On the Structure and Functions of the Rostellum in *Listera ovata*—p. 152. On the Immediate Principles of the Excrements of Man and Animals in the healthy condition; by William Marcet, M.D.—p. 153. On the Vine-disease, in the Port wine districts of the Alto Douro, in April, 1854; with a Supplementary Note on the proposed Remedies for its Eradication; by Jos. James Forrester, Esq., F.R.G.S.—p. 155. Observations on the Respiratory Movements of Insects; by the late William F. Barlow, Esq., F.R.C.S.—p. 167. On the Impregnation of the Ovum in the Stickleback; by W. H. Ransom, M.D.—p. 168. The Physical Theory of Muscular Contraction; by Charles Bland Ratcliffe, M.D.—p. 183. On the Structure of some Limestone Nodules enclosed in Seams of Bituminous coal, with a description of some Trigonocarpons contained in them; by J. D. Hooker, M.D., F.R.S., and Joseph Binney, Esq.—p. 188. Remarks on the Anatomy of the *Macgillivrayia pelagica* and *Chelctropis huxleyi* (Forbes), suggesting the establishment of a new order of Gasteropoda; by John D. Macdonald, R.N.—p. 191, 309. On the Development of Muscular Fibre in Mammalia; by William S. Savory, M.D., F.R.C.S.—p. 194. Micro-chemical researches on the Digestion of Starch and Amylaceous foods; by Philip B. Ayres, M.D.—p. 225. Account of some recent researches near Cairo, concerning the Geological History of the Alluvial Land of Egypt, part I.; by Leonard Horner, Esq., F.R.S.S.L. and E., F.G.S.—p. 233. Note to a paper entitled "Contributions to the Anatomy of the Brachiopoda," read June 15, 1854; by Thomas H. Huxley, Esq., F.R.S.—p. 241. On the Structure, Functions, and Homology of the Manducatory Organs in the Class Rotifera; by P. H. Gosse, Esq.—p. 245, 292. On the Anatomy of *Nautilus umbilicatus*, compared with *N. Pompilius;* by John D. Macdonald, Esq., R.N.—p. 311. On the Descent of Glaciers; by Rev. H. Moseley, M.A., F.R.S.—p. 333. Some Observations on the Ova of the Salmon, in relation to the Distribution of Species; by John Davy, M.D., F.R.SS. Lond. and Edin.—p. 362. On the Anatomy and Affinities of the *Phyllirrhoe bucephala* (Peron); by John D. Macdonald, Esq., R.N.—p. 363. Brief sketch of the Anatomy of a new genus of Pelagic Gasteropoda, named *Jasonilla;* by the same—p. 368. An Experimental Inquiry into the nature of the Metamorphosis of Saccharine matter, as a normal process of the Animal economy; by Frederick W. Pavy, M.D.—p. 370. An Experimental Inquiry, whether any *force* is evolved during Muscular Contraction, analogous to the force evolved in the Fish, Gymnotus and Torpedo; by Foster Baxter, Esq.—p. 378. On the Human Voice; by Manuel Garcia, Esq.—p. 399. Remarks on Rev. H. Moseley's Theory of the Descent of Glaciers; by James D. Forbes, D.C.L., F.R.S.—p. 412. Researches on the Foraminifera; by William B. Carpenter, M.D., F.R.S.; Part I., General Introduction, and Monograph of the genus *Orbitolites*—p. 417. On a supposed Aërolite or Meteorolite found in the Trunk of an old Willow-tree in the Battersea Fields; by Sir Roderick J. Murchison, F.R.S.—p. 421. Anatomical Notices; by Prof. Andrew Retzius, of Stockholm—p. 437. On the Ultimate Arrangement of the Biliary Ducts, and on some other points in the Anatomy of the Liver of Vertebrate Animals; by Lionel S. Beale, M.B.—p. 454. Notes on British Foraminifera; by J. Gwyn Jeffrys, Esq., F.R.S.—p. 485. Results of the Examination of certain Vegetable Products from India, Part I.; by John Stenhouse, LL.D., F.R.S.—p. 536. On the Structure and Development of the *Cysticercus cellulosæ*, as found in the Pig; by George Rainey, Esq.—p. 548.

JOURNAL OF THE PROCEEDINGS OF THE LINNEAN SOCIETY. 8vo. London: Longman, Brown, and Co., and Williams and Norgate.

VOL. I. No. 2. June, 1856.

ZOOLOGY.—(Newport) On the Natural History of the glowworm; continued —p. 64–71. (Viner) Quantity of Tannin in galls of *Cynips quercuspetioli*—p. 72, 73. (Newman) Note on *Lepidosiren annectens;* abstract of—p. 73, 74.

(Westwood) *Paussus murrayi* n. sp. from Old Calabar, Central W. Africa—p. 74–76. (Yarrell) Influence of the sexual organs in modifying external character—p. 76–82. (Walker) Catalogue of Homopterous Insects collected at Singapore and Malacca by Mr. Wallace, with descriptions of the new species—p. 82.

Botany.—(Kippist) Notice of two species of *Genetyllis;* continued—p. 49-52. (Berkeley) On a fungus found imbedded in the fens of Cambridgeshire—p. 52. (Bentham) Notes on Loganiaceæ—p. 52-96.

Proceedings of the Zoological Society of London. 8vo. London. Part XXII.; with twenty-nine Plates. 1854.

Mammalia.—(Gray, J. E.) *Heliophoca atlantica* n. g., n. sp. of seal, from Madeira, Algeria, &c.—p. 43, 44. *Petrogale xanthopus*, n. sp.—p. 249. On the horn of a new species of Rhinoceros, *Rh. crossii*—p. 250, 251. (Owen) Anatomy of the great Anteater, *Myrmecophaga jubata*—p. 154-157. (Gulliver) Size of red corpuscles of the blood of the great Anteater—p. 24. Birds.—(Burgess) Habits of Indian birds—p. 1-6, 45-48, 102, 103, 142-144, 158-161, 255-258. (Gould) *Musophaga rossiæ*, n. sp.—p. 23. *Threnetes cervinicauda*, a new humming bird from Quijos—p. 109. *Momotus castaneiceps*, n. sp. from Guatemala—p. 154. *Malacocychla dryas*, a bird of Guatemala, constituting a n. g. of thrushes—p. 285, 286. (Harcourt) *Regulus maderensis*, n. sp.—p. 153. (Moore) Monograph of g. *Ruticilla*, with descr. of some n. spp.—p. 25-30. New and little known spp. of birds from N. India, in the Museum of H. E. I. C.—p. 74-78, 104-107, 141, 142. Notice of g. *Orthotomus* Horsf., with descr. of a n. sp. and of those hitherto known—p. 78-82. *Delichon nipalensis*, an Indian swallow, forming a n. g.—p. 104. List of all the known species of g. *Accentor*, and descr. of a n. sp. from Nepaul—p. 116-120. Descr. of three n. spp. of titmice—p. 139, 140. List of Malayan birds collected by Mr. Cantor, with descr. of imperfectly known spp.—p. 258-285. Descr. of two n. spp. of *Orthotomus*—p. 309, 310. (Owen) On the bones of the leg of Dinornis, *Palapteryx struthioides* and *Palapteryx gracilis*—p. 244-248. (Sclater) New or imperfectly described spp. of Tanagers—p. 95-98. List of collection of birds received by Mr. Gould from the province Quijos, Republic of Ecuador—p. 109-115. Two n. spp. of Tanagers, in British Museum collection—p. 157, 158. *Calliste venusta*, a n. sp. of Tanager, from Santa Fe de Bogota, &c.—p. 248. *Procnias*, second species, *P. occidentalis*, from N. Grenada—p. 249. *Dacnis*, two n. spp., and on the general arrangement of the genus—p. 251, 252. Six new species of the sub-family Formicarinæ—p. 253-255. Mollusca.—(Adams, A.) Further contributions to the natural history of the Trochidæ, with descr. of a n. g. Turcica, and several n. spp. from Mr. Cuming's collection—p. 37-41. Description of a n. g. *Larina*, and several n. spp. of Gastropod Mollusca, from the same coll.—p. 41, 42. Monographs of two n. gg. of Gastropod Mollusca, *Actæon* and *Solidula*, with descr. of several n. spp. from the same coll.—p. 58-62. Monograph of *Cerithidea*, a genus of Mollusca, with descr. of several n. spp., from the same coll.; also of two spp. of *Colina* and one of Donax—p. 83-87. Description of new species of shells (39 and 27) from the same coll.—p. 130-137, 311-317. (Adams, H. and A.) Monographs of two n. gg. of Pulmoniferous Mollusca, *Ellobium* and *Melampus*—p. 7-13. Contributions to the Natural History of the Auriculidæ, a family of Pulmoniferous Mollusca, with descriptions of many n. spp. from Mr. Cuming's collection—p. 30-37. (Deshayes) Descriptions of new species of shells from Mr. Cuming's collection—p. 13-23, 62-72, 317-371. (Gaskoin) Description of two n. spp. of land shells from Lord Howe Island—p. 162. (Gray, J. E.) On the reproduction of the lost part of an operculum, and its probable restoration when entirely destroyed—p. 100, 101. On *Runcina hancocki*—p. 107. On the g. *Modiolarca*—p. 108. On the g. *Mulleria* of Sowerby, or *Acostæa* D'Orb—p. 129, 130. (Layard) Observations on *Paludomus* Sw., with descr. of several n. spp. and a n. sp. of *Anculotus*—p. 87-94. (Lowe) Catalogus Molluscorum Pneumonatorum Insularum Maderensium, or a List of all the land and freshwater shells,

recent and fossil, of the Madeira islands, &c.—p. 161-218. (Newcomb) Abstract of descriptions of some animals of *Achatinella*, &c.—p. 310, 311. (Pfeiffer) Monograph of the genera *Realia* and *Hydrocœna*—p. 304-309. Descriptions of new shells from Mr. Cuming's collection; viz.: *Bulimus*, 4 n. spp.—p. 57, 58. *Pythia*, 3 n. spp.—p. 298, 299. Helicea, 138 n. spp.—p. 49-57, 122-126, 145-150, 286-298. Auriculacea, 6 n. spp.—p. 121, 122. Cyclostomacea, 29 n. spp.—p. 126-129, 299-303. Cyclostomacea and Auriculacea, 7 n. spp.—p. 150-152. (Reeve) *Voluta deshayesii*, n. sp. from N. Caledonia—p. 73. Annulata.—(Baird) *Cypris triangularis*, n. sp. from Kordofan—p. 6. (Westwood) Description of some Lepidopterous insects of the g. *Oiketicus*—p. 219-243. Minutes of Proceedings. Index, &c.

Part XXIII.; with thirty-four Plates. 1855.

Mammalia.—(Crisp) On the relative weight of the body and viscera of the elephant—p. 186-188. On some points of the anatomy of the Tasmanian wolf, *Thylacinus cynocephalus*, and the Cape hunting dog, *Lycaon pictus*—p. 188-191. (Gray, J. E.) Notice of the horns of an unrecorded species of the Pronghorn in the Derby Museum, Liverpool—p. 9-11. On the horns and skull of the Arnee—p. 17. Birds.—(Burgess) Habits of Indian birds—p. 27-35, 70-74, 79-83, 184, 185. (Gray, G. R.) A n. sp. of *Somateria*, and the female *Lampronetta fischeri* Brandt—p. 211, 212. (Gould) Eight new species of birds from S. America—p. 67-70. *Ruticilla erythroprocta* n. sp. from Erzeroum—p. 78. Two new Humming birds of g. *Heliothrix*—p. 86, 87. *Prion brevirostris*, n. sp.—p. 87, 88. New species of birds collected by Mr. M'Gillivray—p. 164-166. *Eugenia imperatrix*, n. g. and sp. of Trochilidæ from Ecuador—p. 192. (Moore) New species of birds—p. 215-217. (Sclater) On the g. *Culicivora* and the species of it—p. 11, 12. On the arrangement of the Jacamars or Gallulidæ, with descr. of some new spp.—p. 13-16. *Thamnophilus*, 6 n. spp—p. 18, 19. Synonymie remarks on the 16 species of Texan birds named by Mr. Girand of N. York in 1841—p. 65, 66. *Todirostrum nigriceps*, n. sp.—p. 66, 67. On some new or little known species of birds, in the Derby Museum, Liverpool—p. 74-77. Description of four new or little known Tanagers—p. 83-85. New species of Ant thrushes, Formicarinæ, from Sta. Fe de Bogota—p. 88-90. New species of birds from Sta. Fe—p. 109, 110. On the birds received in collections from Sta. Fe—p. 131-164. Characters of some apparently new spp. of Bucconidæ, with a geographical table of the family—p. 193-196. Note on the g. *Legriocinclus* of Lefron, and its synonyms—p. 212-214. *Buarremon leucopterus*, a new Tanager—p. 214. Two new species of Tanagers—p. 227, 228. Reptiles.—(Gray, J. E.) On some new spp. of freshwater Tortoises, from N. America, Ceylon, and Australia, in the British Museum—p. 197-202. On *Corucia*, a new genus of fish-scaled lizards, Scissosauræ, from N. Guinea—p. 217. Mollusca.—(Adams, A.) Two new genera, *Clea* and *Erinna*, and several n. spp. of Mollusca, from Mr. Cuming's collection—p. 119-124. Twenty-five new spp. of shells from the same collection—p. 221-226. (Carpenter) Supposed new species and varieties of shells, of the Californian and W. Mexican coasts, chiefly from Mr. Cuming's collection—p. 228-235. (Deshayes) On the g. *Galeomma*—p. 167-171. On the g. *Scintilla*—p. 171-181. New species of *Erycina*—p. 181-183. (Pfeiffer) Descriptions of 43 new species of *Achatinella*, in Mr. Cuming's collection, collected by Messrs. Newcomb and Fink, in the Sandwich islands—p. 1-7, 207-210. *Anaulus*, n. g. and 23 n. spp. of Pneumonopoma, from same coll.—p. 101-106. Helicea, 47 n. spp. from same—p. 91-101. New species of land shells (9, 38, and 5), from same collection—p. 7-9, 111-119, 210, 211. (Woodward) On *Panopœa aldrovandi*—p. 218-221. Annulata.—(Westwood) Descriptions of some species of Cleridæ, collected at Singapore by Mr. Wallace—p. 19-26. Radiata.—(Gray, J. E.) Arrangement of the families of Echinida, with descriptions of some new genera and species—p. 35-39. (Houldsworth) Description of a new Sea Anemone, *Scolanthus sphæroides*—p. 85, 86. *Actinia*, two new species from the S. Coast of Devon—p. 235-237. Miscel-

LANEOUS—(Brent) Notices of the destruction of Conger eels by frost—p. 46, 29. (Hodgson) On the Geographical distribution of the Mammalia and Birds of the Himalaya—p. 124-128. (Torrens) On native impressions regarding the Natural History of certain Indian animals—p. 129-131. Minutes of Proceedings. Index, &c.

THE ANNALS AND MAGAZINE OF NATURAL HISTORY; including Zoology, Botany, and Geology. No. 103, July; No. 104, August; No. 105, September, 1856. 8vo. With Plates. London: Taylor and Francis. No. 103 and 105. Price, 2s. 6d. each. No. 104. Price, 5s.

No. 103, July:—(Andrew Murray, Edinburgh) Monograph of the Genus Catops. (Dr. J. E. Gray, F.R.S.) On a second new species of Sphærium from the Paddington Canal. The Paddington Canal seems to be quite an El Dorado for sphærii, but we think that further investigation will place S. Pisidioides *Gray* as a synonym of Cyclas cornea and S. pallidum of C. lacustris *Drap.* (Alfred R. Wallace) On the habits of the Orang-Utan of Borneo. (George Busk, F.R.S.) Polyzoa collected by Mr. M'Andrew on the coast of Norway and Finmark in 1856. (S. P. Woodward, F.G.S.) On the evils of increasing synonyms. (John Denis Macdonald, R.N., Assistant Surgeon H. M. S.V. Torch) Observations on the External characters and internal anatomy of a Bitentaculate Slug found at the Island of Aneiteum, New Hebrides. (Professor Arthur Henfrey, F.R.S.) On vegetable cell-formation. (Thomas H. Huxley, F.R.S.) On the method of Palæontology. Bibliographical Notices.—The Ferns of Great Britain. The Fern Allies. British Poisonous Plants—all illustrated by John E. Sowerby. The descriptions by C. Johnston. Proceedings of Learned Societies: Zoological Society, June 12: 26, 1855. Royal Institution of Great Britain, May 2, 1856. Botanical Society of Edinburgh, April 10, 1856. Miscellaneous: Edwardsia vestita (Forbes) Cyclas lacustris. Occurrence of Clausilia Mortilleti *Dum.* in Kent. On the Siliceous Sporangial sheath of the Diatomaceæ. Travels in Central America; by Mon. Scherzer and Wagner. On the non-existence of Polarizing Silica in the organic kingdom; by Professor J. W. Bailey. Meteorological Table and Observations for May, 1856.

No. 104, August:—A double Number, with six plates. (Dr. Ferdinand Cohn) On the Development and Propagation of Sphæroplea annulina. (W. H. Benson) New Terrestrial Shells from Ceylon, with a general list of the species inhabiting that Island. (C. W. Peach) Notice of a curious metamorphosis in a Polype-like animal, with a plate. (J. Denis Macdonald) Brief outline of the anatomy of the genus Atlas (*Lesueur*); with a plate. (Dr. Max Schultze) On the development of Arenicola piscatorum; with remarks upon that of other Branchiferous annellides; with a plate. (H. J. Carter, Assistant Surgeon H.C.S. Bombay) Notes on the Fresh-water Infusoria of the Island of Bombay—No. 1, Organisation; with three plates. (Andrew Murray, Edinburgh) Monograph of the genus Catops, continued from page 24. (William Webster) On a new British species of Skenea. (J. E. Gray, F.R.S.) Description of a new species of Dolphin (Steno) from the upper parts of the River Amazon. Bibliographical Notices.—Manual of Geology, by John Phillips; Tenby, by P. H. Gosse; Manual of British Botany, by C. C. Babington; Trees and their nature, by Dr. Harvey. Proceedings of Learned Societies.—Zoological Society, July 10-24, 1855; Botanical Society of Edinburgh, May 8, June 12, 1856. Miscellaneous.—On the probable origin of the organised beings now living in the Azores, Madeira, and the Canaries; by M. Oswald Heer. Note on Clausilia plicatula and C. mortilleti; by J. Gwyn Jeffreys. On Lernea branchialis. On the new species of Birds from Santa. Fé di Bogota; by P. Sclater. On the British Diastylidæ; by C. Spence Bate. Note on Helix Cantiana *Mont.*; by W. Lonsdale. Description of a Fossil Cranium of the Musk Buffalo, from the gravel at Maidenhead, Berks; by Prof. Owen. A last word on Scissurella; by J. Gwyn Jeffreys. New mode of cleaning Diatomaceous Deposits, and on a new method of disintegrating masses

of Fossil Diatomaceæ; by Prof. W. Bailey. Meteorological Observations and Table for June, 1856.

No. 105, September:—(N. R. Wallace) Attempts at a Natural arrangement of Birds. (Arthur Henfrey) Recent discoveries in Vegetable Embryogeny. (Philip H. Gosse, F.R.S.) On Edwardsia carnea, a new British Zoophyte; with a plate. (H. J. Carter) Notes on the Freshwater Infusoria of the Island of Bombay; No. 1. Organisation. (W. H. Benson) Descriptions of one Indian and nine new Burmese Helices, and notes on two Burmese Cyclostomacea. (John Lowe) On an abnormality in the Flowers of Salix Andersoniana. (Philip H. Gosse, F.R.S.) Cardium exiguum:—its Siphons and its Byssus; with a plate. Bibliographical Notices.—Introduction to Entomology; by Kirby and Spence. Ferny Combes; by Chanter. Proceedings of the Zoological Society, Nov. 13, 1855. Miscellaneous.—On the vitality of Anguillulæ of mildewed wheat; by C. Davaine. Notice of a new species of Nocturnal Lizard from Mexico; by Dr. Gray. On a new genus and species of Trochilidæ from Ecuador; by John Gould, F.R.S. Meteorological Observations and Table for July, 1856.

The Zoologist. No. 165, July; No. 166, August; No. 167, September, 1856. 8vo. London: John Van Voorst. Price 1s. each.

No. 165, July:—Proceedings of Societies.—Entomological Society, June 2, 1856. (A. C. Smith) Origin of the name Horse-chesnut. (S. Stone) Amours of the Hedgehog. (W. Baker) Occurrence of the little Owl at Maidstone. (J. H. Gurney) Rare birds in Norfolk and Suffolk; remarkable destruction of Sea Birds on Norfolk coast. (T. J. Bold) Crossbill breeding in North of England. (H. Stevenson) Golden Oriole near Norwich; Note on the broad-billed Sandpiper in Norfolk; Late appearance of the long-tailed Duck; Note on Sari's Warbler, and on a variety of the Grasshopper Warbler. (R. N. Dennis) Occurrence of the Black Stork in Kent. (J. J. Briggs) Remarks on Anacharis Alsinastrum. (Weekly Intelligencer) Vanessa Antiopa; Melitæa Athalia; Habit of Hensimene firubriana; Elachista tæniatella; Tinea biselliella; Nomada borealis. (E. C. Buxton) On Daplidice and Lathonia. (E. Shepherd and H. Doubleday) Notodontæ not double-brooded. (R. F. Logan) Note on the Geometrinae. (H. Doubleday) Note on Dorithea circuitaria. (P. H. Vaughan) Occurrence of Platypteryx Sicula near Bristol. (C. S. Gregson) Description of Coleoptera Vitisella; a new species of Tineina. (F. Smith) How Vespa rufa builds its nest. (John N. Power, M.D.) Notes on the genus Haliplus. (T. Vernon Wollaston) Coleopterous genus new to Britain. (Edward Newman) Captures of Cryptocephalus and Agrilus biguttatus; Ravages of Otiorhynchus scabrosus on the Hop; Capture of Hydroporus scalesianus. (J. J. Reading) Capture of Carabus intricatus in Devonshire. (J. W. Douglas) Capture of Heliomanes umbellatarum. (W. Alford Lloyd) Occurrence in Britain of Edwardsia vestita. Notices of New Books.—Annals and Magazine of Natural History.

No. 166, August. Notices of New Books.—On the Variation of Species, with especial reference to the Insecta, followed by an Inquiry into the Nature of Genera. The Natural History of Ireland. The Natural History Review. (H. T. Stainton) Entomological Botany, with more especial reference to the plants frequented by the Tineina. (Thomas Edward) A list of the Birds of Banffshire, accompanied with Anecdotes. (Rev. William Henry Hawker, M.A.) Zoology from the Seat of War. (Edward J. Tuck) Occurrence of the Rose-coloured Pastor and Woodchat in Hertfordshire. (Capt. R. W. Hadfield) Anecdote of Swallows; Tubercular Excrescences of the Hedgesparrow; Attack on a Cat by Hedgesparrows. (Charles William Peach) Egg Prodigies. (W. Webster) Description of a supposed new Skenea: occurrence of Crenella costulata and Modiola phaseolina in Mounts Bay. (R. S. Edleston) "Do the Males of certain of our Lepidopterous Insects," &c., &c. (T. Wildman) Early appearance of Vanessa Atalanta. (Intelligencer) Aporia Cratægi in Kent; Aporia Cratægi; Colias Hyale. (Samuel Stevens) Capture of Trochilium Chrysidiforme. (Intelligencer) Trochilium Cyni-

piforme; Strange Habit of Lasiocampa Trifolii; Occurrence of Drepana Sicula near Bristol. (P. H. Vaughan) Capture of a second specimen of Platypteryx Sicula near Bristol, in 1856. (Intelligencer) Botys Terrealis. (Henry Doubleday) Omission in Mr. Doubleday's List of Eupitheciæ. (O. P. Cambridge) Occurrence of Graphiphora Ditrapezium in Dorsetshire. (W. H. Hayward) Late appearance of Cucullia Chamomillæ. (J. Jenner Weir) Captures of Lepidoptera at Pembury, Kent. (Intelligencer) Captures of Lepidoptera at Brighton. (F. O. Standish) Captures of Lepidoptera in 1856; Cabera rotundaria; Notodonta dictæoides, N. dromedarius and N. camelina; Retinia sylvestrana; Capture of two new British Tinea at Box Hill; Capture of Coleophora conspicuella in Headley Lane. (Intelligencer) On the Habits of Argyresthia glaucinella; Attractiveness of Glyceria fluitans to Moths. (C. S. Gregson) What the Lancashire Entomologists have to "brag" about. (Robert Hunter) Singular Effect of Fascination on a Fly. (Thomas John Bold) Capture of Hydroporus melanarius in Cumberland. (W. J. Bernhard Smith) Note on the Nests of Hydrophilus caraboides and Hydröus piceus. (Thomas John Bold) Capture of Ochina Ptinoides in Cumberland. (J. Jenner Weir) Capture of Anthribus albinus at Pembury. (George Guyon) Mononychus pseudacori. (W. Alford Lloyd) Edwardsia vestita. (George Guyon) Occurrence of the Serotine Bat in the Isle of Wight.

No. 167, September :—(Rev. W. T. Brice, M.A.) Nugæ Helveticæ: Scraps relating to Natural History, gathered during a Tour in Switzerland in the Summer of 1855. (H. T. Stainton) Entomological Botany (with more especial reference to the Plants frequented by the Tineina. Proceedings of Societies.—Entomological Society (R. Q. Couch, M.R.C.S.) Notice of the occurrence in Cornwall of that rare Zoophyte, Retepora reticulata. (Thomas Edward) Occurrence of the Rosy Featherstar and the Dotted Brittle-star at Banff. (J. H. Gurney) Instance of a Honey Buzzard feeding on Blackbirds' Eggs. (Frederick Smith) Extraordinary Effect of Sudden Cold on Swifts. (Jonathan Couch, F.L.S.) Particulars of some of the Habits of the Dipper. (Daniel Graham) Occurrence of the Rosecoloured Pastor at York. (H. W. Hadfield) The House Sparrow a Flycatcher; Gray Longbeak. (W. F. Foottit) Occurrence of the Avocet near Newark. (Rev. J. Greene, M.A.) Note on "Manual of British Butterflies and Moths." (John S. Ashworth) Reply to Mr. Gregson's Observations at p. 5,210 of the "Zoologist." (A. G. More) Colias Edusa. (W. Borrer, jun.) Capture of Deilephila Galii in Sussex. (P. H. Gosse) On the Use of the Anal Fork in the Larva of the Puss Moth. (R. S. Edleston) Correction of an Error. (Arthur Naish) Notodonta camelina double-brooded. (Edward Parfitt) Alteration of the name of Callimome flavipes: occurrence of Deiopeia pulchella near Exeter, &c. (T. Vernon Wollaston) Note on the Occurrence of Scraptia nigricans. (Edward Newman) Great Gathering of Phædon Vitellinæ. (C. S. Gregson) Corrections of Errors in Communication to "Zoologist," p. 5,210.

Hooker's Journal of Botany, and Kew Garden Miscellany. No. 90, July; No. 91, August; No. 92, September, 1856. 8vo. London: Lovell Reeve. With Plate. Price 2s. each.

No. 90, July :—Original Papers.—(Rev. M. J. Berkeley) Decades of Fungi; Decades 57, 58; with plates; 5, 6, 9, and 10; Rio Negro Fungi. (Dr. Ferdinand Mueller) Definitions of rare or hitherto undescribed Australian Plants, chiefly collected within the boundaries of the Colony of Victoria. Botanical Information.—The Ensete of Bruce. Notices of Books.—Geographie Botanique Raisonnee; par M. Alph. de Candolle. 2 vols. 8vo. The Transactions of the Jamaica Society of Arts from December, 1854, to December, 1855. Vol. I. 4to. Kingston, Jamaica. Synopsis Aroidearum; by H. Schott. Vol. I., 8vo. Vindobonæ, 1856.

No. 91, August :—Original Papers.—(A. R. Wallace) On the Bamboo and Durian of Borneo. (W. Mitten) On some undescribed species of Musci belonging to the genera Mnium and Bryum; with a plate. (Rev. M. J. Berkeley) Decades of Fungi; Decades 59, 60; with plates; 5, 6, 9, and 10. Rio Negro

Fungi. (J. D. Hooker, M.D., F.R.S.) On three new species of Acrotrema from Ceylon. Botanical Information.—Extract from the Report of Dr. Ferdinand Mueller, the Government Botanist of Victoria. Dr. Mueller takes advantage of the curious fact of the existence in the heart of the Australian Alps of such plants as Alchemilla vulgaris, Botrychium lunaria and others, to suggest that there is no foundation for the theory that all species emigrated each from its own centre of creation. Notices of Books. Géographie Botanique Raisonnée; par M. Alph. de Candolle. Dr. L. Lindsay's Popular History of Lichens.

No. 92, September:—(William Mitten) A List of the Musci and Hepaticæ collected in Victoria, Australia; by Dr. F. Mueller. (G. H. Thwaites, F.L.S.) Description of new genera and species of Ceylon Plants, and a note of the genus Prosorus, Dalzell. (Rev. M. J. Berkeley, A.M., F.L.S.) Decades of Fungi; Decades 61, 62; with plates 5, 6, 9, and 10. Rio Negro Fungi. Botanical Information.—Flora Vectensis. Bunya-Bunya. The fruit of the Araucaria Bidwilli *Hook.* Mexican Botany:—Collections of Plants on sale with Mr. R. F. Hohenaker, Esslingen, near Stuttgart. Araucaria imbricata. Notices of Books.—Ferns of Great Britain and Ireland. Nature printed. Analecta Botanica; by H. Schott. Part I. 8vo. 1854.

The Phytologist. A Botanical Journal. Published Monthly. 8vo. London: W. Pamplin. With Plates. New Series. No. 15, July; No. 16, August; No. 17, September, 1856. Price, 1s.

No. 15, July:—(W. Lauder Lindsay, M.D.) On the Flora of Holstein. (Rev. H. A. Stowell) Some observations on the Flora of Faversham. (T. Moore, F.L.S.) On the Vascular Bundles of the Stipes of Ferns, and a note on Lastrea spinulosa. On Pulmonaria augustifolia, and P. officinalis. The common Beech a native of England. (M. D.) On density of the annual rings of Timber. Common Plants. Reviews. Botanical Notes. Notices and Queries. Death of Dr. E. Steudel. Communications received. Descriptive British Botany. Eight pages.

No. 16, August:—Remarks on the nationality or nativity, denizenship or citizenship of Plants. Statistics of the Order Cruciferæ. Result of a few hours botanizing about North Mines. Rare Plants in West Surrey. Isatis tinctoria. Reviews. Botanical Notes. Notices and Queries. Descriptive British Botany. Eight pages.

No. 17, September:—Notes and observations on a Botanical tour in the Highlands of Perthshire. Note on Aconitum napellus. (Rev. Hugh A. Stowell) Common Plants. (J. G. Baker) Periodic Phenomena of vegetation at Thirsk. Reviews (while thanking our friendly contemporaries for the notices which we receive under this title, we would suggest that our pages are not altogether deficient in Botanical information. No. X., which is noticed in this number of the Phytologist, contains, in addition to Mr. W. Andrew's paper, one by Dr. Kinahan, on Botrychium lunaria, and one by Dr. Frazer, on Saprolegnia ferox). Botanical Notes. Notices and Queries. Communications received. Books received for Review. Descriptive British Botany. Eight pages.

Edinburgh New Philosophical Journal; exhibiting a View of the Progressive Discoveries and Improvements in the Sciences and Arts. Edited by Thomas Anderson, M.D., Sir W., Jardine, Bart., and T. H. Balfour, M.D. No. 7. July, 1856: to be continued quarterly. 8vo. Price 6s.; with eight Plates.

(John Davy, M.D.) An account of some experiments on certain Sea-weeds of an edible kind. (Alexander Bryson) Expositions of some mechanical Inventions of Dr. Robert Hooke. (Hugh Macmillan) On the rare Lichens of Ben Lawers. (Daniel Wilson, LL.D.) Displacements and extinction among the Primeval Races of man. (H. F. Baxter) An Experimental Inquiry, undertaken with the view of ascertaining whether any signs of current electricity are manifested in plants during vegetation. (Robert Harkness) On the occurrence of Scalariform Tissue in the Devonian strata of the South of Ireland. (Lieutenant A. Agloun) Geology at the

Southern concave. (T. Strethill Wright, M.D.) On the Reproduction of Cydippe pomiformis, and on the occurrence of two new Actiniæ. Only one of these Actiniæ is new to science, and has received the specific name of Ornata, belongs, as would appear from the description, to the genus Sagartia of Gosse, and is of a beautiful orange-brown colour, prettily dotted with white spots. The second Sagartia bellis is announced as an addition to the Scottish Fauna only. (J. Gallelly) On the double salts of Cadmium and the organic bases. (M. Jules Verraux) Notice of the systematic position and manners of Balæniceps, &c. (Gould) Notice of the late James Wilson, Esq., of Woodville. Reviews; Proceedings of Societies; and Scientific Intelligence.

Quarterly Journal of Microscopical Science. No. 16, July, 1856. 8vo. Price 4s. With Woodcuts and a Lithographic Plate. London: John Churchill.

(William Gregory, M.D., M.R.I.A.) On the Post tertiary Diatomaceous sands of Glenshira. Pt. III.; containing an account of additional undescribed species. (Arthur Henfrey, F.R.S.) Notes on some Fresh-water Confervoid algæ new to Britain. (F. H. Wenham) On a Method of illuminating Opaque objects under the highest power of the microscope, and on the Vegetable Cell. (D. F. D'Alquin) Notes on the structure of Oscillatoriæ; with a description of a new species possessing a most remarkable locomotive power, not Cilia. (Rev. J. B. P. Dennis) The existence of Mammifers anterior to the deposition of the Lias, demonstrated from the microscopic structure of a bone from the River-bed deposit, Lyme Regis. (Edwin Lankester, M.D., F.R.S.) On the presence of microscopic Fungi in water deleterious to health. (T. Brightwell, F.L.S.) Further observations on the genus Triceratium; with descriptions and figures of new species. (Samuel Highley, F.G.S.) Contributions to Micro-mineralogy. (Leuckaert) On the Mycropyle and minute structure of the Egg-shell in Insects. Reviews.—Transactions of the Pathological Society. Vol. VI. Rustic Adornments for homes of taste. By T. Hibberd. The Microscope. By Dr. Lardner. Notes and Correspondence.—Zoophytology. Index and Title page to Vol. IV.; with ten plates.

The Naturalist: a popular monthly Magazine, with numerous Engravings; conducted by Rev. F. O. Morris, B.A. No. 65, July. No. 66, August. No. 67, September, 1856. 8vo. Price 6d. each. London: Messrs. Groombridge.

No. 65, July:—(S. Hannaford) Phascolomys Wombat. (O. S. Round) The Flight of Birds. (R. G. Temple) The Birds of Spring. (Robert Anderson) Notice of a peculiar Organ in the Trachea of the Emeu. Communicated. (Rev. F. O. Morris) A Chapter on Instinct. (E. M. A.) Our Fresh-water Mollusca. (The Editor) Systema Naturæ. Natural History Societies. Miscellaneous Notices.—Anecdote of a Cat. Nidification in Norfolk. The Eagle lately shot in the Park. Sparrow War. The Nightingale. The Shieldrake. Ravages of a Gall Nut. Ants. Method of Blowing Eggs. Review.—The Autobiography of a White Cabbage Butterfly. By Michael Westcott. With a few Introductory Remarks by Beverley R. Morris, Esq., A.B., M.D. Wells: W. and R. George Proceedings of Societies.—The London Working Entomologists' Society. The Querist.—The Dabchick. The Great Crested Grebe, &c.

No. 66, August:—(Thomas Foggitt) On the Incongruous Attachment of Animals. (O. S. Round) The Youth of Birds. (W.) A Third Medley. (G. R. Twinn) Bird Retreating. (J. M'Intosh) Injurious Insects. No. VI. Aphis, Aphides, or Plant-lice. (O. S. Round) On the Weather. (G. R. Temple) The House Swallow. (The Editor) Systema Naturæ. Miscellaneous Notices.—Peregrine Falcon. Wood Warbler. Grasshopper Warbler. Bittern. Occurrence of the Dotterel in Cambridgeshire. Common Crossbill and Little Owl. The Fieldfare. The Dipper. The Bat. Curious situation for the Nest of the Blue Tit. Capture of Carabus intricatus in Devonshire. Reviews.—A Natural History of Ireland, in four volumes. Vol. IV. Mammalia, Reptiles, and Fishes; also Inver-

tebrata. By the late William Thompson. A Dictionary of Botanical Terms. By the Rev. J. S. Henslow, M.A. The Sea-side Lesson Book. By H. G. Adams. The Village Lesson Book. By Martin Doyle. The Book and its Missions. Edited by L. N. R. The Natural History Review, July, 1855. The Fly-fisher's Entomology. By Alfred Ronalds. A Natural History of the Animal Kingdom. By W. S. Dallas, F.L.S. The Querist.—Chrysalides. Manchester Museum of Natural History. Obituary.—Death of Mr. John Leadbeater, F.R.S., &c.

No. 67, September:—(O. S. Round) Rare Birds' Nests. (W.) A Fourth Medley. (Thomas Fuller) On the scarcity of Birds in certain districts. (W. Sutherland) A visit to Bræmar in 1855. (W. Sutherland) Botanical Notes. (J. S. Walker) Three Days in the Falkland Islands. (W. Webster) Minute Skenea, with Engraving. (The Editor) Systema Naturæ. Miscellaneous Notices.—Callimorpha Hera a British Insect. Capture of Birds in Brunswick-square, Brighton. Singular treatment of a Fly by a Wasp. The Querist.—The Great Crested Grebe.

TRANSACTIONS OF THE LINNEAN SOCIETY OF LONDON. 4to. London.

Vol. XI. (four parts, 1852–1855); with thirty-four Plates. 1855.

ZOOLOGY. VERTEBRATA.—(Adam) Osteological relations in the Bovine family —p. 237–241. (Yarrell) Habits and structure of the Great Bustard *Otis tarda* L. —p. 155–160. ANNULATA.—(Bell) Horæ Carcinologicæ; I. A Monograph of the Leucosiadæ; with five plates—p. 277-313. New genera, *Leucosilia*, *Myrodes*, *Phlyxia*, *Lithadia*, *Nursilia*. (Blackwall) Experiments on the poison of Araneidea—p. 31-37. (Curtis) *Selandria robinsoni* n. sp. of saw-fly; with a plate—p. 39–42. On the g. *Myrmica* and other indigenous ants; with a plate—p. 211–220. On Affinities and Analogies, and on *Hypocephalus*, a genus of Coleoptera; with a plate—p. 227–236. (Newport) Anatomy and development of some Chalcidæ and Ichneumonidæ; *Anthophorabia* n. g.; with a plate—p. 61-77, 79–83, 85–93. On the ocelli in *Anthophorabia*; with figures—p. 161–165. On *Monodontomerus*, and on *Heteropus ventricosus*, a new Acarus, parasitic in the nests of *Anthophora retusa;* with figures—p. 95–102. Natural History, Anatomy, and development of *Meloe;* continued; with a plate—p. 167-183. (Westwood) Australian species of *Bolboceras;* with a plate—p. 11-18. New species of *Bolboceras;* with a plate—p. 19-30. ZOOPHYTA.—(Gosse) *Peachia hastata*, n. g., n. sp., with observations on the family Actiniadæ; with two plates—p. 267-276. BOTANICAL PHYSIOLOGY, ETC.—(Allemao) On the origin and development of Vessels in Monocotyledonous and Dicotyledonous plants; with a plate—p. 259–266. (Henfrey) Development of the Ovule in *Orchis Morio* L.; with a plate—p. 7–10. Development of the Spores and Elaters of *Marchantia polymorpha;* with a plate—p. 103–110. On the Elaters of Trichia; with figures—p. 221–223. On the development of Ferns from their Spores; with three plates—p. 117-139. (Miers) Structure of Seed and Embryo in the Clusiaceæ; with a plate—p. 243–258. DESCRIPTIVE BOTANY.—(Berkeley) *Badhamia* and *Corynites*, two n. gg. of Fungi; with a plate—p. 149-154. (Bunbury) On the vegetation of Buenos Ayres—p. 185-198. (Champion) Ternstrœmiaceæ of Hong Kong; with two plates—p. 111–116. (Kippist) *Acradenia*, n. g. of Diosmeæ; with a plate—p. 207–209. (Miers) On *Atamisquea* a. g. of Capparidaceæ; with a plate—p. 1–5. On the family Triuriaceæ; with two plates—p. 43-59. Two new genera of Plants from Chile, *Oxytheca*, Eicogoneæ, and *Oxycladus*, Bignoniaceæ; with two plates—p. 141–148. (Roxburgh) On the g. *Aquilaria*, with remarks by the late H. T. Colebrooke; with a plate—199–206. (Thwaites) On the g. *Ancistrocladus* of Wallich; with figures—p. 225. MINUTES.—p. 315. Catalogue of Library—p. 317–352.

THE

NATURAL HISTORY REVIEW.

JOURNAL

OF THE

GEOLOGICAL SOCIETY OF DUBLIN.

SESSION 1855-56.

With Three Lithographs, and Woodcuts.

VOL. III.

LONDON:
WILLIAMS AND NORGATE, HENRIETTA-STREET.
DUBLIN: HODGES, SMITH, AND CO.
EDINBURGH: WILLIAMS AND NORGATE.
1856.

DUBLIN:
Printed at the University Press,
BY M. H. GILL.

INDEX.

PAGE.

Annual Address, ... 82
Appendix to Annual Report, ... 91
Artrea, Co. Tyrone, Occurrence of Permian Magnesian Limestone in, . . . 67

Berehaven, Igneous Rocks of, ... 154

Chinchas, Geology of, ... 175
Carboniferous Limestone of Ireland, localities of Fossils in, ... 1
——— Lower Beds of the Peninsula of Hook, Co. Wexford, ... 146
Classification of the Devonian and Carboniferous Rocks of the South of Ireland, 63
Culdaff, Co. Donegal, Fossils in limestone of, ... 163

Foot, Frederick, ... 167
Fossils in Ireland, localities for, ... 1
——— in limestone of Culdaff, Co. Donegal, ... 163

Ganly, Patrick, ... 163, 164

Haughton, Rev. Professor, ... 146

Jukes, J. Beete, F. R. S., ... 63, 172

Kelly, John, ... 1, 115
Killarney, Geology of the Lake district of, ... 97
——— Trappean Rocks in the neighbourhood of, ... 167
Kinahan, G. H., ... 154

PAGE.

Kinahan, Dr. J. R., ... 175
King, Professor William, ... 67

Localities for Fossils of the Carboniferous Rocks in Ireland, ... 1

Malahide, Lord Talbot de, President, ... 82

Noyer, George V. du, ... 97

Palæozoic Rocks of Ireland, &c., ... 115
Permian Limestone in Artrea, Co. Donegal, ... 67
President's Address, ... 82

Report, Annual, of Council, ... 89

Structure of Strata, Observations on, ... 164

Trappean Rocks in neighbourhood of Killarney, ... 167

JOURNAL

OF THE

GEOLOGICAL SOCIETY OF DUBLIN.

The Society met on the 14th of March, 1855, on which occasion the following Paper was read.

ON LOCALITIES OF FOSSILS OF THE CARBONIFEROUS LIMESTONE OF IRELAND. BY JOHN KELLY, ESQ.

The carboniferous limestone is perhaps the best developed and the best defined of the rocks of our island. The formation of which the limestone forms a part has a line or junction of sedimentary unconformability at its base, and another at the top, where the New Red Sandstone overlies it. In the Carboniferous formation, between those two junctions, all the beds are parallel to each other, or in one bundle, if I may so term it. Since, therefore, there is such an opportunity, it appears incumbent on our Geological Society to furnish a good account of this division of the formation, toward which I hope the present paper will be of use.

Many of the members of this Society are aware that the fossils of the carboniferous limestone of Ireland, including the slates which lie beneath it, and form a part of the formation, have been described by Mr. Frederick M'Coy, late Professor of Geology at the Queen's College, Belfast; and a Synopsis of them printed at the instance of Mr. Griffith in 1844; but all will see with regret that the usual practice in all such works has been departed from in this case, and that no locality is given in that book for any one fossil.

As this Synopsis is now the most complete descriptive account of our Irish carboniferous limestone fossils, and is likely to continue

so for some time, this paper is brought forward as an accompaniment to it, and to leave on record the different localities in which the fossils so described have been found, so that those localities may not be forgotten or lost.

In considering how this should be done, it appears to me that a general Table is the most eligible form; this to consist of a list of the names of all the fossils in the Synopsis; the authority for the original name and description; the mineral character of the rock in which any fossil occurs; and a few of the chief localities whence each was obtained.

After this Table will be an alphabetical list of all the localities in which fossils were found, amounting in number to about two hundred and eighty; giving the name of the place, with a short description of the quarry or ravine in which the fossils occur, and its bearing and distance from the nearest post-town. Thus a person, having even a temporary residence in any town, may know the places of interest regarding fossils in his vicinity, and make further search, where a first and perhaps imperfect trial has been made before.

As Mr. M'Coy has changed the names of many of the old genera, and divided others, I deem it necessary to give the old names, which is done by means of letters of reference, and corresponding marginal notes.

In the Carboniferous formation there are four kinds of rocks, distinct in mineral character; the lowest or first division of these is—

1. Old Red Sandstone.
2. Calcareous slate.
3. Limestone.
4. Coal-measures, being chiefly argillaceous shales and slates, with some sandstones and ironstones.

Some of the fossils of the formation are found in sandstone, and not in any other of these divisions; some are peculiar to the calcareous slate; some to limestone; and some are found only in the black mud deposits or slates of the coal measures. Again, some of the fossils are common to two of those mineral divisions, and some are found in three of them. The molluscous fossils of the Old Red Sandstone are very few and scarce, being mostly casts, and are in general not found in any other division.

For these reasons I have thought it advisable to classify the fossils according to the mineral character of the beds in which they are found, and I have, therefore, put in the Table four small columns to suit the four subdivisions above-named.

At Benburb, in the county of Armagh, in the cutting for the Lough Erne and Lough Neagh Canal, a section is visible in which sandstones, limestones, and calcareous slates, three or four bands of each, are interstratified with one another, in about a quarter of a mile of distance, all dipping westward at an angle of about 20°; and facts of this nature are not unusual in the north of Ireland. In all such cases, the fossil, found in a limestone band, I have put into the column for limestone; every fossil got in calcareous slate is marked in the slate column; and those found in sandstone are entered in the column for that rock, and so also with the molluscous fossils of the coal series.

The millstone grit and coal-measures I have included in one mineral subdivision or column; because those two in Ireland are conformable and alike. I do not know how many feet above the limestone the millstone grit ends, or the coal-measures begin. There does not appear in this country any good reason for these distinctions.

The plants of the coal-measures are not included in the Table. No good collection of them from Irish collieries has been described. Many fine specimens of undescribed plants were got at Dromagh colliery, near Kanturk, in the county of Cork, in 1842, but Mr. M'Coy did not describe any new plants in the Synopsis.

Opposite the name of every fossil a star is put in the column, representing the mineral subdivision in which it was found; where a fossil has been got in two or three of those subdivisions, a star is put in the proper column in each case, to represent it.

Where two stars are marked in one column and one in another, they show that the fossil is more abundant in the division marked with two stars than in the other; and where three are marked in one column, they show that the fossil has been found in three localities at least, in that subdivision, and not in any other, or that the fossil is peculiar to that mineral subdivision.

The names of localities in general are the townland names on the Ordnance maps: but in a few cases, deviations are made from this rule; for instance, Malahide is given as one locality, although it

includes the whole shore from Portmarnock Martello Tower to the village of Malahide, which comprises part of several townlands; but these deviations are explained in every case in the detailed description of the locality.

Where two or three localities are given for a fossil, the first name represents the lowest mineral subdivision, and the last name refers to the highest in geological sequence.

Where a fossil was found in several different places, say thirty for instance, for want of room in the Table only three of the principal localities are given; but as, in addition, it was got in twenty-seven other localities, this figure is put in the last column, headed, "Other Localities." The object of this is to show the abundance of a particular fossil in the formation.

To make the Table more complete for Ireland I have introduced into the list made from the Synopsis such fossils of the Carboniferous formation as were described by Colonel Portlock, and not found by Mr. Griffith's collectors; also, any described as from Ireland by Phillips, Sowerby, Austen, or any other, so far as I know. The Table, therefore, contains all the fossils published of this formation.

The English geologists often give a parish, a county, or Ireland as the locality of a fossil; some of those are therefore unsatisfactory for my purpose, and not knowing what mineral column to put them into, I have therefore omitted to put them in any.

The whole number of fossils named in the Table is 1050. Of these, in the order of time, are first described by—

Sowerby, in Mineral Conchology,		62
Phillips, Geology of York,	255	364
Phillips, Palæozoic Fossils,	109	
Fleming, British Animals,		9
Agassiz, Poissons Fossiles,		46
Portlock, in Geological Report,		80
M'Coy, in Synopsis,		442
Austen, in Annals of Natural History,		27
Others, a few each,		20
Total,		1050

The total number of fossils described in the Synopsis by M'Coy is 893, of which 442, or about one half, are new to science, not having been described before.

EXPLANATION OF ABBREVIATIONS IN THE COLUMN OF AUTHORITIES.

Ag.	Agassiz, Poissons Fossiles.
Aus. A. N. H. . . .	Austen, Annals of Natural History.
Aus. M. Cr.	Austen, Monograph of Crinoidea.
Bronn, ...	Bronn, Lethea Geognostica.
Buck.	Buckland's Bridgewater Treatise.
Flem. A. P.	Fleming, Annals of Philosophy.
Flem. B. A.	Fleming, British Animals.
Gold.	Goldfuss, Petrefacten.
Kon.	Koninck, Description des Animaux Fossiles.
Lam.	Lamarck, Animaux sans Vertebre.
Lons.	Lonsdale.
Mart.	Martin, Petrifacta Derbiensia.
M'C.	M'Coy, Synopsis.
M'C. A. N. H. . . .	M'Coy, Annals of Natural History.
Mill.	Miller's Crinoidea.
Mün.	Münster.
Phil. G. Y.	Phillips' Geology of York.
Phil. P. F.	Phillips' Palæozoic Fossils.
Port.	Portlock's Geological Report.
Schlot.	Schlotheim Pet.
Sco.	Scouler, MSS.
Sow. G. T.	Sowerby, Geological Transactions.
Sow. M. C.	Sowerby, Mineral Conchology.
Sow. S. S.	Sowerby, Silurian System.
Sow. Z. J.	Sowerby, Zoological Journal.
Ver. B. S. G. F., . .	De Verneuil, Bulletin Societé Geologique de France.

EXPLANATION OF ABBREVIATIONS IN THE COLUMNS FOR MINERAL CHARACTER.

O. R. S.	Old Red Sandstone.
Cal. Sl.	Calcareous Slate.
Limest.	Limestone.
Coal.	Coal series.

I may remark here, that I use the term Calcareous Slate in preference to Carboniferous Slate,—a name recently given to this subdivision of the formation, because all the slates in the whole formation are carboniferous slates: and those slates above the main body of the limestone, in the coal-measures, are more eminently carboniferous than the slates which lie below it, that is, those in question, which are eminently calcareous in their nature, and generally interstratified with thin beds of limestone.

SYNOPTICAL TABLE.—LIST OF FOSSILS AND LOCALITIES.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
PISCES.							
Asteroptychius ornatus.	Ag. 3.	.	.	*	.	Armagh.	
,, Portlocki.	Ag. 3.	.	.	*	.	Armagh.	
Charcharopsis prototypus.	Ag. 3.	.	.	*	.	Armagh.	
Chomatodus cinctus.	Port. xiv. A. 9.	.	.	*	.	Armagh.	
,, linearis.	Port. xiv. 8.	.	.	*	.	Armagh.	
,, truncatus.	Ag. 3.	.	.	*	.	Armagh.	
Cladodus acutus.	Ag. 3. Port.	.	.	*	.	Armagh.	
,, basalis.	Ag. 3. Port.	.	.	*	.	Armagh.	
,, marginatus.	Ag. 3.	.	.	*	.	Armagh.	
,, mirabilis.	Ag. 3.	.	.	*	.	Armagh.	
,, striatus.	Ag. 3.	.	.	*	.	Armagh.	
Cochliodus acutus.	Ag. 3.	.	.	*	.	Armagh.	
,, contortus.	Ag. 3 14. 16.	.	.	*	.	Armagh.	
,, magnus.	Port. xiv. A. 4.	.	.	*	.	Armagh.	
,, oblongus.	Port. xiv. A. 5. 10.	.	.	*	.	Armagh.	
,, striatus.	Ag. 3.	.	.	*	.	Armagh.	
Cricacanthus Jonesii.	Ag. 3.	.	.	*	.	Armagh.	
Ctenacanthus arcuatus.	Ag. 3.	.	.	*	.	Armagh.	
,, crenulatus.	Ag. 3.	.	.	*	.	Armagh.	
,, heterogyrus.	Ag. 3.	.	.	*	.	Armagh.	
Ctenoptychius macrodus.	Port. xiv. 7.	.	.	**	.	Armagh, Carnteel.	
,, dentatus.	Ag. 3.	.	.	*	.	Armagh.	
,, marginalis.	Ag. 3.	.	.	*	.	Armagh.	
,, radicans.	Ag.	.	.	*	.	Armagh.	
,, serratus.	Ag. 3.	.	.	*	.	Armagh.	
Gyracanthus formosus.	Ag. 3; 1, 8.	.	*	.	.	Moyola River.	
,, tuberculatus.	Port. xiii. 14, 15.	.	*	.	.	Moyola River.	
Helodus didymus.	Ag. 3.	.	.	*	.	Armagh.	
,, lævissimus.	Ag. 3; 14, 1-15.	.	.	*	.	Armagh.	
,, mamillaris.	Ag. 3.	.	.	*	.	Armagh.	
,, planus.	Ag. 3.	.	.	*	.	Armagh.	
,, turgidus.	Ag. 3; 15, 1-12.	.	.	**	.	Armagh. Templecarn.	
Holoptychius Hibbertii.	Port. xiv. A. 12.	.	**	.	.	Cultra, Moyheeland.	
,, Portlockii.	Port. xiii.	.	**	.	.	Moyola River, Fallagloon.	
Leptacanthus priscus.	Ag. 3.	.	.	*	.	Armagh.	
Onchus falcatus.	Ag. 3.	.	.	*	.	Armagh.	
,, plicatus.	Ag. 3.	.	.	*	.	Armagh.	
,, rectus.	Ag. 3.	.	.	*	.	Armagh.	
Oracanthus confluens	Ag. 3.	.	.	*	.	Armagh.	
,, minor.	Ag. 3; 3-5, 6.	.	.	*	.	Armagh.	
Orodus angustus.	Ag.	.	.	*	.	Armagh.	
,, catenatus.	Ag.	.	.	*	.	Armagh.	
,, cinctus.	Ag. 3; 11. 1-4.	.	.	*	.	Cork.	
,, gibbus.	Ag.	.	.	*	.	Armagh.	
,, ramosus.	Port. xiv. A. 8.	.	.	**	.	Hook Point, Cork.	
Paleoniscus Egertoni.	Port. xiv. 1.	.	*	.	.	Drumkeeran.	
,, Robisoni.	Port. xiv. A. 13, 15.	.	*	.	.	Enniskillen.	
Petalodus Hastingsæ.	Port. xiv. 10.	.	.	**	.	Armagh, Clogher.	
,, lævissimus.	Ag. 3.	.	.	*	.	Armagh.	
,, marginalis.	Ag. 3.	.	.	*	.	Armagh.	
,, psittacinus.	Ag.	.	.	*	.	Armagh.	
,, radicans.	Ag. 3.	.	.	*	.	Armagh.	
,, rectus.	Port. xiv. 9.	.	*	*	.	Bundoran, Armagh.	
,, sagittatus.	Ag 3.	.	.	*	.	Armagh.	
Ptysonemus subteres.	Ag. 3.	.	.	*	.	Armagh.	
Pœcilodus Jonesi.	Port. xiv. A. 6.	.	.	*	.	Armagh.	
,, obliquus.	Ag. 3.	.	.	*	.	Armagh.	
,, parallelus.	Ag. 3.	.	.	*	.	Armagh.	
,, sublævis.	Ag. 3.	.	.	*	.	Armagh.	
,, transversus.	Port. xiv. A. 7.	.	.	*	.	Armagh.	
Psammodus cornutus.	Port. xiv. A. 3.	.	*	*	.	Armagh.	
,, porosus.	Port. xiv. A. 1.	.	.	***	.	Armagh, Derryloran, Desertmartin.	
,, rugosus.	Ag. 3, 12-14.	.	.	**	.	Armagh, Carnteel.	
Tristychius minor.	Port. xiv. 6.	.	*	.	.	Drumkeeran.	

NAME.	AUTHORITY.	O. R. S.	Cal. Sl.	Limest.	Coal.	LOCALITIES.	Other localities.
CEPHALOPODA.							
Orthoceras attenuatum.	Flem. A. P.	.	**	*	.	Fallagloon, Bundoran, Rathgillen.	6
,, cinctum.	Sow. M. C.	.	.	*	**	Rathgillen, Ballintree, Cahenanalt.	
,, cylindraceum.	Flem. A. P.	.	.	***	.	Rathcline, Curkeen, Tankardstown.	4
,, filiferum.	Phil. G. Y.	.	*	.	**	Lisnapaste, Culkagh, Carrownanalt.	
,, inequiseptum.	Phil. G. Y.	.	.	.	*	Carrownanalt.	
,, mucronatum.	M'C. i. 1.	.	.	.	*	Miltown Malbay.	
,, ovale.	Phil. G. Y.	.	.	***	.	Rathgillen, Ardclogh, Armagh.	
,, pyramidale.	Flem. A. P.	.	*	**	.	Larganmore, Millecent, Doneraile.	
,, Steinhaueri.	Phil. G. Y.	.	*	.	*	Lisnapaste. Cahirush.	
,, striatum.	Sow. M. C.	.	.	**	.	Carrigahorig, Little Island.	
,, sulcatulum.	M'C. i. 4.	.	.	.	*	Culkagh.	
Loxoceras[a] Breynii.	Sow. M. C.	.	.	***	.	Millecent, Streamhill, Little Island.	
,, distans.	M'C. iv. 1.	.	.	*	.	Kilmallock.	
,, incomitatum.	M'C. i. 6.	.	.	.	.	Cove or Queenstown.	
,, laterale.	Phil. G. Y.	.	*	**	*	Lisnapaste, Millecent, Little Island, Carrownanalt.	9
Trigonoceras[b] paradoxicum.	Sow. M. C.	.	.	*	.	Millecent.	
Campyloceras[c] arcuatum.	Phil. G. Y.	.	.	*	.	Blacklion.	
,, unguis.	Phil. G. Y.	.	.	*	.	Little Island.	
Cycloceras[d] annularis.	Flem. A. P.	.	.	*	.	Tornaroan.	
,, lævigatum.	M'C. i. 3.	.	.	*	.	Shrule.	
,, lineolatum.	Phil. P. F.	.	.	*	.	Doneraile.	
Potrioceras[e] fusiforme.	Phil. G. Y.	.	.	*	.	Millecent.	
,, ventricosum.	M'C. i. 2.	.	.	*	.	Millecent.	
Actinoceras[f] giganteum.	Sow. M. C.	.	.	***	.	Castle Espie, Armagh, Millecent.	
,, pyramidatum.	M'C. i. 5.	.	.	*	.	Castle Espie.	
Cyrtoceras tuberculatum.	M'C. iv. 2.	.	*	*	.	Bundoran, Cork.	
Phragmoceras flexistria.	M'C. i. 7.	.	*	.	.	Killycloghy.	
NAUTILIDÆ.							
Goniatites Browni.	M'C. iv. 17.	.	.	*	.	Cork.	
,, crenistria.	Phil. G. Y.	.	*	.	.	Lisnapaste.	
,, discus.	M'C. ii. 6.	.	.	*	.	Cork.	
,, excavatus.	Phil. P. F.	.	*	**	.	Lisnapaste, Ballyduff, Blacklion.	
,, fasciculatus.	M'C. ii. 8.	.	.	*	.	Millecent. [rownanalt.	
,, Gibsoni.	Phil. G. Y.	.	*	.	**	Ballinacourty, Paget Priory, Car-	
,, Gilbertsoni.	Phil. G. Y.	.	.	.	*	Carrownanalt.	
,, granosus.	Port. 29–9.	.	*	.	.	Tyrone.	
,, intercostalis.	Phil. G. Y.	.	**	.	.	Killyrean Upper, Crosspatrick.	
,, latus.	M'C. ii. 7.	.	.	*	.	Millecent. [nalt.	
,, Listeri.	Phil. G. Y.	.	.	**	*	Carrickahorig, Millecent, Carrowna-	
,, micronotus.	Phil. G. Y.	.	*	.	.	Ballinacourty.	
,, mutabilis.	Phil. G. Y.	.	.	*	.	Cregg.	
,, obtusus.	Phil. G. Y.	.	.	***	.	Cregg, Millecent, Ballyduff.	
,, reticulatus.	Phil. G. Y.	.	**	.	.	Mullaghtinny, Lisnapaste.	
,, rotiformis.	Phil. G. Y.	.	.	.	*	Kulkeagh.	
,, serpentinus.	Phil. G. Y.	.	.	.	*	Carrownanalt.	
,, sphæricus.	Phil. G. Y.	.	.	.	.	Kildare (Morris).	
,, sphæroidalis.	M'C. iv. 18.	.	.	**	.	Nenagh, Kilmallock.	
,, spiralis.	Phil. P. F.	.	.	.	*	Ballintree.	
,, striatus.	Phil. G. Y.	.	.	*	.	Drumscraw. [nalt.	
,, striolatus.	Phil. G. Y.	.	*	*	*	Mullaghtinny, Blacklion, Carrowna-	
,, truncatus	Phil. G. Y.	.	.	**	.	Millecent, Tankardstown.	
,, vesica.	Phil. G. Y.	.	.	.	.	Kulkeagh.	
,, Vittiger.	Phil. G. Y.	.	.	.	*	Carrownanalt.	
Clymenia plurisepta.	Phil. P. F.	.	*	.	.	Bruckless.	
,, sagittalis.	Phil. P. F.	.	*	.	.	Bruckless.	
Discites[g] costellatus.	M'C. ii. 4.	.	.	*	.	Millecent.	
,, discors.	M'C. iii. 5.	.	.	**	.	Millecent, Cork.	
,, latidorsatus.	M'C. iv. 16.	.	.	**	.	Millecent, Cork.	
,, Luidii.	Mart. Derb.	.	.	.	*	Carrownanalt.	
,, mutabilis.	M'C. iii. 7.	.	.	***	.	Armagh, St. Doulough's, Cork.	
,, oxystomus.	Phil. G. Y.	.	.	*	.	Drumscraw.	

[a] Loxoceras, was Orthoceras. [b] Trigonoceras, was Orthoceras. [c] Campyloceras, was Orthoceras.
[d] Cycloceras, was Orthoceras. [e] Potrioceras, was Orthoceras. [f] Actinoceras, was Orthoceras.
[g] The Discites of M'Coy is the Nautilus of other writers.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
NAUTILIDÆ—*continued.*							
Discites planotergatus.	M'C. ii. 2.	.	.	*	.	Little Island.	
,, subsulcatus.	Phil. G. Y.	.	.	**	.	Millecent, Little Island.	
,, sulcatus.	Phil. G. Y. M'C. iv. 14.	.	**	*	.	Ring, Mullaghfarry, Little Island.	3
,, tetragonus.	Phil. G. Y.	.	**	*	.	Lisnapaste, Bruckless, Blacklion.	
,, trochlea.	M'C. iii. 4.	.	.	*	.	Cookstown.	
Temnocheilus[a] biangulatus.	Phil. G. Y.	.	*	**	.	Ballinacourty, Millecent, Middleton.	5
,, bistrialis.	Phil. G. Y.	.	.	*	.	Blacklion.	
,, cariniferus.	Phil. G. Y.	.	.	***	.	Tirlicken, Millecent, Ardclogh.	
,, coronatus.	M'C. iv. 15.	.	.	*	.	Little Island.	
,, costalis.	Phil. G. Y.	.	.	*	.	Millecent.	
,, carinatus.	M'C. ii. 9.	.	.	*	.	Tirlicken.	
,, furcatus.	M'C. iv. 13.	.	*	**	.	Crevenish, Castlerickard, Middleton.	
,, globatus.	Sow. M. C.	.	.	**	.	Cork, Fortwilliam.	
,, multicarinatus.	Sow. M. C.	.	.	***	.	Tirlicken, Millecent, Little Island.	
,, pinguis.	M'C. iv. 12.	.	.	**	.	Kilmallock, Ballyduff.	
,, porcatus.	M'C. iii. 6.	.	.	*	.	Killeshandra.	
,, sulciferus.	Phil. G. Y.	.	.	***	.	Rathcline, Millecent, Ardclogh.	
,, tuberculatus.	Phil. G. Y.	.	*	.	.	Kilbride.	
Nautilus cyclostomus.	Phil. G. Y.	.	.	***	.	Millecent, Little Island, Blacklion.	
,, dorsalis.	Phil. G. Y.	.	.	***	.	Millecent, Little Island, Kilcommock.	
,, goniolobus.	Phil. G. Y.	.	*	.	.	Mullaghtinny.	
,, planidorsatus.	Port. 35. 1.	.	.	*	.	Derryloran.	
Bellerophon apertus.	Phil. G. Y.	.	.	***	.	Ballinglen, Carlingford, Ardclogh.	11
,, cornu arietis.	Phil. G. Y.	.	.	**	.	Magherenny, Armagh.	
,, costatus.	Phil. G. Y.	.	.	***	.	Cookstown, Carlingford, Ardagh.	
,, decussatus.	Port. 29. 6.	.	*	.	.	Tyrone.	
,, hiulcus.	Phil. G. Y.	.	*	**	.	Killaghtee, Ballinglen, Ardclogh.	
,, lævis.	M'C. ii. 1.	.	.	*	.	Millecent.	
,, obsoletus.	M'C. ii. 3.	.	.	*	.	Millecent.	
,, reticulatus.	M'C. ii. 5.	.	.	*	.	Tornaroan.	
,, striatus.	Port. 29. 7.	.	*	.	.	Tyrone.	
,, tangentialis.	Phil. G. Y.	.	.	***	.	Carlingford, Ardagh, Millecent.	
,, tenuifascia.	Phil. G. Y.	.	.	***	.	Ardagh, Millecent, Curkeen.	
,, Wenlockensis.	Phil. P. F.	.	.	*	.	Ballinglen.	
Euphemus[b] globatus.	Phil. P. F.	.	.	*	.	Derryloran.	
,, orbiculus.	Not figured.	.	.	*	.	Locality lost.	
,, intersectus.	M'C. iii. 10.	.	.	*	.	Cookstown. [town.	
,, urii.	Phil. G. Y.	.	*	**	.	Mullaghtinny, Tornaroan, Cooks-	
PTEROPODA.							
Conularia quadrisulcata.	Sow. M. C.	.	.	.	*	Locality lost.	
GASTEROPODA.							
Macrocheilus[c] acutus.	Phil. G. Y.	.	.	**	.	Millecent, Laracor.	
,, canaliculatus.	M'C. v. 1.	*	.	.	.	Kilcummin.	
,, curvilineus.	Phil. G. Y.	.	*	*	.	Bruckless, Millecent.	
,, imbricatus.	Phil. G. Y.	.	.	*	.	Millecent.	
,, fimbriatus.	M'C. v. 2.	.	*	.	.	Dromard.	
,, ovalis.	M'C. v. 3.	.	*	.	.	Bruckless.	
,, parallelus.	Phil. G. Y.	.	.	*	.	Armagh.	
,, percinctus.	Port. 31. 10.	.	.	*	.	Derryloran.	
,, rectilineus.	Phil. G. Y.	.	.	**	.	Drumlattery, Little Island.	
,, sigmilineus.	Phil. G. Y.	.	.	*	.	Kildare.	
,, tricinctus.	M'C. v. 4.	.	.	.	.	Locality lost. Ireland (Morris).	
Loxonema[d] brevis.	M'C. iii. 2.	.	.	*	.	Toberory. [cent.	
,, constricta.	Phil. G. Y.	.	.	***	.	St. John's Point, Ballinglen, Mille-	
,, impendens.	M'C. iii. 3.	.	*	*	.	Mullaghtinny, Chicken-hill.	
,, polygyra.	M'C. iii. 1.	.	**	*	.	Cullion, Mullaghtinny, Curkeen.	
,, pulcherrima.	M'C. vii. 7.	.	.	*	.	Lackagh.	
,, sulcatula.	M'C. i. 6.	.	*	.	.	Carrigoughter.	
,, sulculosa.	Phil. G. Y.	.	*	**	.	Bundoran, Millecent, Tankardstown.	
,, tenuistriata.	Port. 31. 4.	.	*	.	.	Aghalurcher, Co. Tyrone.	

[a] Temnocheilus of M'Coy, was Nautilus.
[b] Euphemus, was Bellerophon.
[c] Macrocheilus, was Buccinum.
[d] Loxonema, was Melania.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
GASTEROPODA—*continued.*							
Loxonema tumida.	Phil. P. F.	.	*	*	.	Bruckless, Tirlicken.	
,, turrita.	M'C. v. 7.	.	.	*	.	Cookstown.	
Turritella megaspira.	M'C. v. 5.	.	.	*	.	Millecent. [rig.	
,, suturalis.	Phil. G. Y.	.	.	***	.	Cookstown, Blacklion, Carrigaho-	
,, tenuistria.	Phil. G. Y.	.	.	***	.	Tirlicken, Horath, Oldtown.	
Turbo spirata.	M'C. v. 29.	.	.	*	.	Killalla.	
Littorina pusilla.	M'C. v. 26.	.	.	*	.	Blacklion.	
Lacuna antiqua.	M'C. v. 24.	.	**	.	.	Corlave, Kilcummin.	
Natica ampliata.	Phil. G. Y.	.	.	.	.	Ireland.	
Naticopsis canaliculata.	M'C. vii. 3.	.	*	.	.	Ring.	
,, dubia.	M'C. vii. 2, 2*a*.	.	.	**	.	Carrigahorig, Carrigaline.	
,, elongata[a].	Phil. G. Y.	.	.	***	.	Castle Espie, Kiltullagh, Millecent.	
,, neritoides.	M'C. v. 25.	.	.	*	.	Tullyoran.	
,, Phillipsii.	M'C. iii. 9.	.	.	***	.	Millecent, Lane, Chickenhill.	5
,, plicistria.	Phil. G. Y.	.	.	***	.	Cookstown, College-hall, Millecent.	4
,, spirata[b].	Sow. M. C.	.	*	**	.	Donegal, Blacklion, Horath.	
Phanerotinus nudus.	Sow. M. C.	.	.	.	.	Ireland.	
Euomphalus[c] acutus.	Phil. G. Y.	.	*	**	.	Larganmore, Armagh, Little Island.	9
,, anguis.	M'C. iii. 11.	.	.	*	.	Chickenhill.	
,, æqualis[d].	Sow. M. C.	.	*	**	.	Malahide, Ballykea, Curkeen.	
,, bifrons.	Phil. G. Y.	.	*	**	.	Bruckless, Millecent, Tankardstown.	
,, calyx.	Phil. G. Y.	.	*	**	.	Bruckless, Millecent, Tankardstown.	
,, catillus.	Phil. G. Y.	.	*	**	.	Granard, Horath, Millecent.	
,, cristatus.	Phil. G. Y.	.	.	*	.	Roscommon.	
,, colei.	Sow. M. C.	.	.	.	.	Ireland.	
,, crotalostomus.	M'C. vii. 4.	.	*	**	.	Finncr, Rathmoyle, Drum.	
,, elongatus.	M'C. iii. 12.	.	.	*	.	Ballinglen.	
,, marginatus.	M'C. v. 21.	.	*	*	.	Malahide, Balsitric.	
,, neglectus.	M'C. v. 23.	.	.	*	.	Millecent.	
,, pentangulatus.	Phil. G. Y.	.	*	**	.	Bruckless, Millecent, Carrigahorig.	22
,, pileopsideus.	Phil. G. Y.	.	.	**	.	Ardagh, Howth.	
,, quadratus.	M'C. v. 22.	.	*	.	.	Mullaghtinny.	
,, rotundatus.	Phil. G. Y.	.	.	***	.	Ballinglen, Ballykea, Millecent.	7
,, serpens.	Phil. P. F.	.	*	**	.	Lisnapaste, Oldtown, Howth.	5
,, tabulatus.	Phil. G. Y.	.	*	**	.	Malahide, Tirlicken, Little Island.	7
,, tuberculatus[e].	Flem. p. 313.	.	.	*	.	Ireland.	
Ampullaria nobilis.	Sow. M. C.	.	.	*	.	Cork.	
Platychisma cirroides.	M'C. vi. 2.	.	.	*	.	College Hall.	
,, helicoides[f].	Phil.	.	.	***	.	Millecent, Curkeen, Cookstown.	
,, Jamesii.	M'C. v. 20.	.	.	*	.	Donaghrisk.	
,, zonites.	M'C. v. 17.	.	.	*	.	Cork.	
Pleurotomaria altavittata.	M'C. v. 11.	.	*	.	.	Drumgowna. [Point.	
,, canaliculata.	M'C. vi. 3*a*, *b*.	.	**	*	.	Doorin, Carrowmably, St. John's	
,, carinata.	Phil. G. Y.	.	.	*	.	Cookstown.	
,, clathrata.	M'C. v. 12.	.	*	.	.	Malahide.	
,, concentrica.	Phil. G. Y.	.	*	**	.	Ring, Cregg, Milverton.	
,, conica.	Phil. G. Y.	.	*	.	.	Donegal.	
,, decussata.	M'C. v. 13.	.	.	*	.	Millecent.	
,, filosa.	M'C. v. 14.	.	.	**	.	Curkeen, Millecent.	
,, Griffithii.	M'C. vi. 1.	.	.	**	.	Ardclogh, Millecent.	
,, Hainesii.	M'C. iii. 8.	.	.	*	.	Cork.	
,, helicinoides.	M'C. vii. 6.	.	.	*	.	Little Island.	
,, lævis.	M'C. v. 15.	.	.	*	.	Ballygasey.	
,, lenticula.	M'C. vii. 5.	.	.	*	.	Little Island.	
,, multicarinata.	M'C. v. 16.	.	.	**	.	Millecent, Little Island.	
,, tornatilis.	Phil. G. Y. / M'C. vii. 5, 5*a*.	.	*	.	.	Lisnapaste.	
Murchisonia elongata.	Port. 38. 10.	.	**	.	.	Dromard, *common*, Cullion.	
,, Larcomi.	M'C. v. 8.	.	*	.	.	Leam.	
,, quadricarinata.	M'C. v. 9.	.	.	*	.	Blacklion.	
,, sulcata.	M'C. v. 10.	.	*	.	.	Cullion.	
Elenchus antiquus.	M'C. v. 18.	.	*	.	.	Bruckless.	
,, subulatus.	M'C. v. 19.	.	.	*	.	Armagh.	

[a] Naticopsis, was Natica. [b] Naticopsis, was also Nerita. [c] Euomphalus, was Cirrus.
[d] Euomphalus æqualis, was Planorbis. [e] Euomphalus, was Delphinula. [f] Platychisma, was Ampullaria.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
SCUTIBRANCHIA AND CYCLOBRANCHIA.							
Trochella prisca.	M'C. vii. 1.	.	.	*	.	Millecent.	
Fissurella elongata.	M'C. v. 27.	.	*	.	.	Lisnapaste.	
Dirinus Bucklandi.	M'C. v. 28.	.	*	.	.	Manorhamilton.	
Acroculia[a] angustata.	Phil. G. Y.	.	.	*	.	Clare.	
,, canaliculata.	M'C. iii. 13.	.	.	*	.	Toberory.	
,, carinata.	No figure. D'Archiac, &c.	.	*	*	.	Ballinacourty, Millecent.	
,, sigmoidalis.	Phil. P. F.	.	*	.	.	Bruckless.	
,, striata.	Phil. G. Y.	.	.	*	.	Kildare.	
,, triloba[a].	Phil. G. Y.	.	**	*	.	Malahide, Hook, Chickenhill.	
,, tubifer[a].	Phil. G. Y.	.	*	.	.	Hook.	
,, vetusta.	Phil. P. F.	.	*	**	.	Hook, Millecent, Little Island.	
Patella mucronata.	Phil. G. Y.	.	*	*	*	Bruckless, Cookstown, Carrownanalt.	
,, scutiformis.	Phil. G. Y.	.	.	**	.	Lackagh, Tralee.	
,, sinuosa.	Phil. G. Y.	.	*	*	.	Bundoran, Millecent.	
Siphonaria Koninckii.	M'C. iii. 14.	.	.	*	.	Ballymacelligot.	
Umbrella lævigata.	M'C. v. 31.	.	.	*	.	Millecent.	
Dentalium inornatum.	M'C. v. 30.	.	.	*	*	Cookstown, Carrownanalt.	
DITHYRA.							
Teredo antiqua.	M'C. viii. 1.	.	*	.	.	Fasglassagh.	
Solenopsis[b] minor.	Port. 36–4. M'C. viii.2.	.	.	*	.	Drumreagh.	
Sanguinolites[c] angustatus.	Phil. G. Y.	.	**	.	*	Lisnapaste, Poulscadden, Glenbane.	3
,, arcuatus.	Phil. G. Y.	.	*	*	.	Ring, Millicent.	
,, attenuata.	Port. 36. 3.	*	.	.	.	Tyrone.	
,, contortus.	M'C. xix. 3.	.	.	*	.	Chickenhill.	
,, costellatus.	M'C. viii. 5.	.	*	.	.	Killycloghy.	
,, curtus.	M'C. xi. 1.	.	*	.	.	Manorhamilton.	
,, discors.	M'C. viii. 4.	*	.	.	.	Bruckless, in yellow sandstone.	
,, gibbosa.	Sow. M. C.	.	*	*	*	Lisnapaste, Roughan, Glenbane.	
,, iridinoides.	M'C. xii. 1.	.	.	.	.	Locality lost.	
,, liratus.	Phil. P. F.	.	.	.	.	Ireland.	
,, maxima.	Port. 36. 1.	.	.	*	.	Tyrone.	
,, oblonga.	Port. 36. 2.	.	.	*	.	Tyrone.	
,, plicatus.	M'C. x. 3*a*, 3*b*. Port. 34. 18.	.	**	.	*	Bruckless, Ballintrillick, Glenbane.	
,, radiatus.	M'C. xiii. 4.	.	.	*	.	Killymeal. [bane.	
,, sulcatus.	Phil. G. Y.	*	*	*	*	Hook, Ballinglen, Cookstown, Glen-	3
,, transversus.	Port. 34. 21.	.	*	.	.	Bunatrahir, Kilcummin.	
,, tricostatus.	Port.	.	**	*	.	Ballybodonnell, Bundoran, Killalla.	
,, tumidus.	Phil. G. Y.	.	*	**	.	Larganmore, Millecent, Carrigoline.	
,, undatus.	Port. 34. 20.	.	***	.	.	Boa Island, Ballintrillick, Mullagh-	3
Solemyo primæva.	Phil. G. Y.	.	.	*	.	Fermanagh. [tinny.	
Anatina attenuata.	M'C. viii. 6.	.	.	*	.	Killalla, in black oolitic limestone.	
,, deltoidea.	M'C. viii. 7.	.	*	*	.	Killybrone, Cleenishgarve.	
Pandora clavata.	M'C. xi. 2.	.	*	.	.	Carrowmacrory.	
Edmondia compressa.	M'C. xiii. 10.	.	.	*	.	Cork.	
Lutraria elongata.	M'C. viii. 3.	.	*	.	.	Dromard.	
,, primæva.	Port. 36. 5.	.	.	*	.	Tyrone.	
,, prisca.	M'C. xii. 4.	.	.	**	.	Millecent, Blacklion.	
Mactra incrassata.	M'C. xix. 8.	.	.	*	.	Chickenhill.	
,, ovata.	M'C. xi. 3.	.	.	*	.	Killalla.	
Kellia gregaria.	M'C. xi. 5.	.	*	.	.	Cultra.	
Psammobia decussata.	M'C. x. 2.	.	.	*	.	Little Island.	
Lucina antiqua.	M'C. viii. 9.	.	*	.	.	Ballintrillick.	
,, Du Noyeri.	Port. 38. 12.	.	*	.	.	Tyrone.	
Ungulina antiqua.	M'C. viii. 8.	.	*	.	.	Bundoran, *common*.	
Amphidesma subtruncata.	M'C. x. 10.	.	**	*	.	Ballintrillick, Bundoran, Millecent.	
,, deltoidea.	Port. 36, 37.	.	*	.	.	Tyrone.	
Corbis cancellata.	M'C. viii. 14.	.	.	*	.	Carrigoline.	
Venus centralis.	M'C. xi. 6.	.	*	.	.	Cullion.	
,, tenuistriata.	M'C. viii. 10.	.	*	.	.	Lisnapaste.	

[a] Acroculia, was Pileopsis. [b] Solenopsis, was Solen. [c] Sanguinolites, was Sanguinolaria.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
DITHYRA—*continued.*							
Pullastra antiqua.	Sow. G. T.	.	*	.	.	Cultra.	
,, bistriata.	Port.	.	**	*	.	Lisnapaste, Rush, Howth.	
,, crassistria.	M'C. xi. 7.	.	*	.	.	Crosspatrick.	
,, elegans.	M'C. viii. 16.	.	*	.	*	Bundoran, Carrownanalt.	
,, elliptica[a].	Phil. G. Y.	.	*	.	*	Bruckless, Glenbane.	
,, ovalis.	M'C. viii. 20.	.	**	.	.	Lisnapaste, Crosspatrick.	
,, parallella[a].	Phil. G. Y.	.	*	.	*	Lisnapaste, Glenbane.	
Astarte gibbosa.	M'C. viii. 11.	.	*	.	.	Bruckless.	
,, quadrata.	M'C. xi. 4.	.	.	*	.	Ballymeeny.	
Cyprina Egertoni.	M'C. x. 9.	.	.	***	.	Millecent, Horath, Chickenhill.	
Donax primigenius.	M'C. x. 7.	.	.	*	.	Cookstown.	
Cardium orbiculare.	M'C. xii. 7.	.	.	**	.	Little Island, Leck.	
Cardiomorpha[b] axiniformis.	Phil. G. Y.	.	.	*	.	Millecent.	
,, corrugata.	M'C. viii. 15.	.	.	*	.	Millecent.	
,, oblonga[b].	Phil. G. Y.	.	.	***	.	Millecent, Howth, Ballyduff.	5
,, ventricosa.	M'C. xiii. 3.	.	.	*	.	Cork.	
Pleurorynchus aliformis.	Phil. G. Y.	.	**	.	*	Hook, Malahide, Carrownanalt.	4
,, armatus.	Phil. G. Y.	.	.	*	.	Howth.	
,, fusiformis.	M'C. ix. 3.	.	.	**	.	Malahide, *common*, Hook.	
,, giganteus.	M'C. ix. 1.	.	.	***	.	Ardloughil, St. John's Point, Hook.	7
,, Hibernicus.	Phil. G. Y.	.	.	***	.	Millecent, Castle Island, Clonea.	5
,, inflatus.	M'C. ix. 2.	.	.	*	.	Carrickboy.	
,, minax.	Phil. G. Y.	.	*	**	.	Finner, Howth, Millecent.	5
,, nodulosus.	M'C. ix. 4.	.	*	.	.	Drumod.	
,, trigonalis.	Phil. G. Y.	.	*	*	.	Lisnapaste, Clontruk.	
Cypricardia alata.	M'C. x. 4.	.	**	.	.	Bruckless, Araglin.	
,, concinna.	M'C. viii. 24.	.	*	.	.	Cullion.	
,, cuneata.	M'C. viii. 25.	.	.	**	.	Blacklion, Balsitric.	
,, cylindrica.	M'C. viii. 23.	.	**	.	.	Ballinglen, Araglin.	
,, modiolaris.	M'C. viii. 27.	.	.	*	.	Killalla.	
,, oblonga.	M'C. viii. 21.	.	**	.	.	Ballinglen, Araglin.	
,, quadrata.	M'C. viii. 22.	.	**	.	.	Ballinglen, Araglin.	
,, rhombea.	Phil. G. Y.	.	**	*	.	Templeboy, Lisnapaste, Lackagh.	
,, sinuata.	M'C. viii. 26.	.	*	.	.	Araglin.	
,, socialis.	M'C. viii. 12.	.	*	.	*	Leam, *abundant*, Carrownanalt.	
,, tumida.	M'C. viii. 13.	.	*	.	.	Larganmore.	
Sedgwickia attenuata.	M'C. xi. 39.	.	*	.	.	River Bannagh.	
,, bullata.	M'C. viii. 19.	.	*	.	.	Cullion.	
,, corrugata.	M'C. viii. 18.	.	*	.	.	Mullaghtinny, *abundant.*	
,, gigantea.	M'C. xi. 40.	.	*	.	.	Carrowmacrory.	
,, globosa.	M'C. xi. 38.	.	**	.	.	Cullion, Ballinglen.	
,, minima.	M'C. viii. 17.	.	*	.	.	Cullion, *abundant.*	
,, tricostata.	Port. 34. 17.	.	.	*	.	Tyrone. [more.	
Axinus[c] axiniformis.	Port. 36. 6.	.	***	.	.	Mullaghtinny, Ballinglen, Largan-	
,, carbonarius[c].	Port. 36. 8.	.	***	.	.	Mullaghtinny, Kilcunmin, Clogher.	
,, centralis.	M'C. xi. 8.	*	.	.	.	Ardshankill, *in yellow sandstone.*	
,, deltoideus[d].	Phil. P. F.	.	***	.	.	Abbey Bay, Bruckless, Ballinglen.	
,, nuculoides.	M'C. xi. 9.	.	**	.	.	Dromard, Fallagloon, *in masses.*	
,, obliquus.	M'C. viii. 29.	.	**	.	.	Mullaghtinny, Larganmore.	
,, obovatus.	M'C. viii. 30.	.	*	.	.	Mullaghtinny.	
,, orbicularis.	M'C. viii. 28.	.	*	.	.	Larganmore.	
Dolabra[e] angusta.	Phil. P. F.	.	.	*	.	Cultra, *in yellow limestone.*	
,, complanata[e].	Phil. P. F.	.	.	*	.	Cultra, *in yellow limestone.*	
,, corrugata.	M'C. xi. 12.	.	*	.	.	Leam.	
,, æquilateralis.	M'C. xi. 14.	.	*	.	.	Doorin.	
,, gregaria.	M'C. xi. 11.	.	*	.	.	Mullaghtinny.	
,, Hardingii[e].	Phil. P. F.	.	.	*	.	Cultra, *in yellow limestone.*	
,, orbicularis.	M'C. xi. 13.	*	.	.	.	Ardshankill, *in yellow sandstone.*	
,, rectangularis.	M'C. xi. 10.	.	*	.	.	Bundoran.	
,, securiformis.	M'C. xi. 15.	.	**	.	.	Larganmore, Rahan's Bay.	
,, trapezium[e].	Phil. P. F.	.	.	*	.	Cultra, *in yellow limestone.*	
,, unilateralis[e].	Sow. G. T.	.	.	*	.	Cultra, *in yellow limestone.*	
Leptodomus fragilis.	M'C. x. 11.	.	*	.	.	Locality lost.	
,, senilis[f].	Phil G. Y.	.	.	**	.	Millecent, Ardagh.	
Venerupis cingulatus.	M'C. x. 1.	.	.	*	.	Howth.	

[a] Pullastra, was Venus. [b] Cardiomorpha, was Isocardia. [c] Axinus, was Amphidesma.
[d] Axinus, was Cypricardia. [e] Dolabra, was Cucullæa. [f] Leptodomus, was Corbula.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
DITHYRA—*continued.*							
Venerupis obsoletus.	M'C. xi. 16.	.	.	*	.	Millecent.	
,, scalaris.	M'C. x. 6.	.	.	**	.	Millecent, Howth.	
ATRACHIA.							
						[tle.	
Nucula[a] attenuata.	Phil. G. Y.	.	***	.	.	Larganmore, Ballintrillick, Ballycas-	
,, birostrata.	M'C. xii. 23.	.	***	.	.	Abbey Bay, Lisnapaste, Bruckless.	
,, brevirostris.	Phil. G. Y.	.	.	.	*	Glenbane.	
,, carinata.	M'C. xi. 21.	.	*	.	.	Lisnapaste.	
,, clavata.	M'C. xi. 25.	.	**	.	*	Bruckless, Ballycastle, Glenbane.	
,, cylindrica.	M'C. xi. 26.	.	**	*	.	Rahoran, Bundoran, Killeshandra.	
,, delta.	M'C. xi. 22.	.	.	.	.	Locality lost.	
,, gibbosa[b].	Phil. G. Y.	.	*	.	*	Bruckless, Glenbane.	
,, leiorynchus.	M'C. xi. 27.	.	***	.	.	Rahoran, Larganmore, Abbey Bay.	
,, lævirostrum.	Port. 36. 12.	.	*	*	.	Tyrone, Armagh.	
,, linearis[c].	Phil. P. F.	.	*	.	.	Lisnapaste. [ran.	
,, longirostris.	M'C. xi. 19.	.	***	.	.	Mullaghtinny, Larganmore, Raho-	
,, oblonga.	M'C. xi. 24.	.	**	.	.	Monaduff, Corick.	
,, Phillipsii[d].	Phil. G. Y.	.	**	.	*	Bruckless, Lisnapaste, Glenbane.	
,, rectangularis.	M'C. xi. 20.	.	*	*	.	Lisnapaste, Cookstown.	
,, stilla.	M'C. xi. 18.	.	***	.	.	Dromard, Leam, Rahoran.	
,, unilateralis.	M'C. xi. 17.	.	**	.	.	Lisnapaste, Abbey Bay.	
Arca cancellata.	Sow. M. C.	.	*	*	.	Lisnapaste, Blacklion.	
,, fimbriata.	M'C. xii. 8.	.	.	**	.	Cregg, Ballyduff.	
Cucullæa arguta.	Phil. G. Y.	.	.	***	.	Bantyre, Mallow, Blacklion.	
,, tenuistria.	M'C. xii. 10.	.	*	**	.	Ballybodonnell, Millecent, Rathgillen.	
Byssoarca clathrata.	M'C. xi. 34.	.	*	.	.	Finner.	
,, costellata.	M'C. xi. 36.	.	.	*	.	Blacklion.	
,, lanccolata.	M'C. xi. 33	.	*	.	.	Lisnapaste.	
,, obtusa[e].	Phil. Sp. G. Y.	.	.	*	.	Millecent.	
,, reticulata.	M'C. xii. 9.	.	*	**	.	Bundoran, Millecent, Blacklion.	
,, semicostata.	M'C. xi. 35.	.	*	.	.	Manorhamilton.	
Crenella acutirostris.	M'C. xi. 37.	*	.	.	.	Bruckless, *the sandstone yellow.*	
Modiola amygdalina.	Phil. P. F.	.	**	.	.	Lisnapaste, Larganmore.	
,, angusta[f].	Port. 34. 15.	.	*	.	.	Larganmore.	
,, concinna.	M'C. xi. 28.	.	.	**	.	Blacklion, Killeshandra.	
,, divisa.	M'C. xi. 30.	.	**	.	.	Larganmore, Carrowmacrory.	
,, lingualis.	Phil. G. Y.	.	*	.	.	Bruckless.	
,, Macadami.	Port. 34. 13.	.	*	.	**	Larganmore, Cultra, Moyheeland.	5
,, megaloba.	M'C. xi. 31.	*	.	.	.	Ardshankill, *the sandstone yellow.*	
,, patula.	M'C. xiii. 13.	.	.	*	.	Cork.	
,, scalaris.	Phil. P. F.	.	**	.	.	Larganmore, Rahoran.	
,, subparallela.	Port. 34. 16.	.	*	.	**	Larganmore, Fallagloon, Cultra.	3
Lithodomus dactyloides.	M'C. xi. 41.	*	.	*	.	Hook Point, Millecent.	
Lanistes obtusus.	M'C. xi. 9.	.	.	*	.	Killymeal.	
,, rugosus.	M'C. x. 8.	.	.	.	.	Locality lost.	
Mytilus comptus.	M'C. xiii. 12.	.	*	.	.	Carrowmacrory.	
,, Flemingi.	M'C. xi. 29.	.	.	*	.	Millecent.	
Inoceramus auriculatus.	M'C. xix. 5.	.	.	*	.	Cork.	
,, lævissimus.	M'C. xix. 6.	.	.	*	.	Cork.	
,, orbicularis.	M'C. xiii. 11.	.	.	*	.	Millecent.	
,, pernoides.	Port. 38. 5.	*	.	.	.	Derryloran.	
,, vetustus.	Phil. G. Y.	.	*	*	*	Killaghtee, Millecent, Carrownanalt.	
Posidonia Becheri.	Phil. P. F.	.	.	.	***	Corry, Ballintrea, Walterstown.	3
,, complanata.	Port. 34. 12.	*	**	.	.	Banada, Clogher, Moyheeland.	3
,, costata.	M'C. xiii. 15.	.	.	.	*	Ballintree.	
,, lateralis.	Phil. P. F.	.	.	.	**	Ballintree, Carrownanalt. [nalt.	
,, membranacea.	M'C. xiii. 14.	.	.	.	***	Walterstown, Baldongan, Carrowna-	
,, similis.	M'C. xii. 2.	.	.	.	**	Walterstown, Courtlough.	
,, transversa.	Port. 38. 9.	.	*	.	.	Fermanagh.	
,, tuberculata.	Phil. P. F.	.	.	.	***	Corry, Carrownanalt, Ballintree.	
Meleagrina alternata.	M'C. xiii. 17.	.	*	*	.	Rahoran, *plentiful*, Easky.	
,, echinata.	M'C. xiii. 18	*	.	.	.	Lisnapaste.	

[a] Nucula attenuata, was Nucula claviformis.
[b] Nucula gibbosa, was Nucula tumida.
[c] Nucula linearis, was Nucula lineata.
[d] Nucula Phillipsii, was Nucula undulata.
[e] Byssoarca obtusa, was Cucullæa obtusa.
[f] Modiola angusta, was Modiola Macadami, *var.*

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
ATRACHIA—*continued.*							
Meleagrina elongata[a].	Port. p. 438.	*	.	.	.	Fermanagh.	
,, lævigata.	M'C. xii. 5.	.	.	***	.	Millecent, Ardagh, Howth.	
,, pulchella.	M'C. xii. 6.	.	*	**	.	Araglin bridge, Millicent, Ardagh.	
,, quadrata.	M'C. x. 5.	.	.	***	.	Millecent, Blacklion, Mullawornia.	
,, radiata[b].	Phil. G. Y.	.	*	**	.	Ballinglen, Knockninny, Blacklion.	
,, rigida.	M'C. xiii. 16.	.	*	.	.	Lisnapaste. [lough's.	
,, tesselata[c].	Phil. G. Y.	.	.	***	.	Blacklion, Cornacarrow, St. Dou-	
Pteronites angustatus.	M'C. xiii. 6.	*	.	.	.	Bruckless, *in sandstone.*	
,, latus.	M'C. xiii. 7.	.	.	*	.	Millecent.	
,, semisulcatus.	M'C. xi. 32.	.	.	**	.	Killymeal, Blacklion.	
,, sulcatus.	M'C. xiii. 5.	.	.	*	.	Manorhamilton.	
,, ventricosus.	M'C. xiii. 8.	*	.	.	.	Ardshankill, *in yellow sandstone.*	
Pterinea desquamata.	M'C. xiii. 2.	.	.	*	.	Cork.	
,, intermedia.	M'C. xiii. 1.	.	*	.	.	Corlave, *common.*	
Avicula angusta.	M'C. xiii. 20.	.	*	.	.	Rahan's Bay.	
,, bicostata.	M'C. xiii. 26.	.	*	.	.	Corlave, *abundant.*	
,, flabellula.	M'C. xiii. 27.	.	*	.	.	Bundoran.	
,, gibbosa.	M'C. xiii. 25.	.	.	*	.	Manorhamilton.	
,, informis.	M'C. xiii. 21.	.	*	.	.	Killogunra.	
,, laminosa.[d]	Phil. G. Y.	.	**	*	.	Bruckless, Bundoran, Millecent.	
,, lævigata.	M'C. xiii. 23.	.	.	*	.	Millecent.	
,, lunulata.	Phil. G. Y.	.	.	***	.	Millecent, Ardagh, Mullawornia.	
,, recta.	M'C. xiii. 24.	.	.	*	.	Millecent.	
,, squamosa.	Phil. G. Y.	.	*	.	.	Ballintrillick.	
,, Thompsoni[e].	Port. 25, A. 30.	.	*	.	.	Rahoran, *abundant.*	
,, Verneuilli.	M'C. xiii. 19.	.	**	.	.	River Bannagh, Drumcurren.	
Pinna[f] flabelliformis.	Phil. G. Y.	.	.	**	.	Easky, Cookstown.	
,, flexicostata.	M'C. xix. 1.	.	.	*	.	Easky.	
,, incquicostata.	Port.	.	.	*	.	Ballinglen.	
,, mutica.	M'C. xix. 11.	.	*	.	.	Kilbride.	
Lingula marginata.	Phil. G. Y.	.	*	.	.	Dromard.	
,, parallela.	Phil. G. Y.	.	*	.	.	Locality lost.	
,, squamiformis.	Phil. G. Y.	.	*	.	.	Lcam, *abundant.*	
Anomia antiqua.	M'C. xix. 7.	.	.	*	.	Millecent.	
Malleus orbicularis.	M'C. xix. 2.	.	.	*	.	Feermaght.	
Lima alternata.	M'C. xv. 4.	.	.	**	.	Killymeal, Ardagh.	
,, concinna.	M'C. xv. 6.	.	*	.	.	Ballinglen, *common.*	
,, decussata.	M'C. xv. 3.	.	.	*	.	Killymeal.	
,, lævigata.	M'C. xiv. 3.	.	.	**	.	Millecent, Blacklion.	
,, obliqua.	M'C. xv. 7.	.	*	.	.	Ballintrillick.	
,, planicostata.	M'C. xv. 5.	.	*	.	.	Bruckless.	
,, prisca.	M'C. xviii. 6.	.	.	*	.	Ardagh.	
,, semisulcata.	M'C. xv. 2.	.	*	.	*	Manorhamilton, Ballintree.	
Pecten æqualis.	M'C. xv. 13.	.	.	*	.	Killymeal.	
,, asperulus.	M'C. xvi. 5.	.	*	*	.	Bundoran, Blacklion.	
,, arachnoideus.	Phil. P. F.	.	**	.	.	Ballinacourty, Brickeen Bridge.	
,, arenosus.	Phil. G. Y.	.	.	***	.	Knockninny, Millecent, Howth.	
,, bellis.	M'C. xv. 15.	.	*	.	.	Rahoran, *abundant.*	
,, cancellatus.	M'C. xiv. 9.	.	.	*	.	Killymeal.	
,, cingendus.	M'C. xvii. 11.	.	*	.	.	Abbey Bay.	
,, clathratus.	M'C. xiv. 12.	.	.	*	.	Little Island.	
,, cœlatus.	M'C. xviii. 2.	.	.	**	.	Redbarn, Cookstown.	
,, cognatus.	M'C. xix. 4.	.	.	*	.	Clonalvy.	
,, comptus.	M'C. xv. 14.	.	*	.	.	Rahoran.	
,, concavus.	M'C. xv. 10.	.	*	.	.	Killogunra.	
,, concentricostriatus.	M'C. xiv. 5.	.	*	**	.	Ballinglen, Killymeal, Millecent.	
,, conoideus.	M'C. xvii. 2.	.	*	**	.	Templeboy, Killalla, Howth.	
,, consimilis.	M'C. xv. 16.	.	*	.	.	Rahoran, *abundant.*	
,, deornatus.	Phil. G. Y.	.	.	*	.	Little Island.	
,, depilis.	M'C. xvi. 11.	.	***	.	.	Abbey Bay, Ballintrillick, Ballinglen.	
,, dissimilis.	Flem., Br. An.	.	*	**	.	Ring, Millecent, Ballyduff.	
,, duplicicosta.	M'C. xv. 9.	.	**	.	.	Drumcurren, Larganmore. [nalt.	
,, ellipticus.	Phil. G. Y.	.	*	*	*	Ballintrillick, Millecent, Carrowna-	16
,, elongatus.	M'C. xvi. 9.	.	.	**	.	Millecent, Ardagh.	

[a] Meleagrina elongata, was Gervillia elongata.
[b] Meleagrina radiata, was Avicula radiata.
[c] Meleagrina tesselata, was Avicula tesselata.
[d] Avicula, was Gervillia.
[e] Avicula Thompsoni, was Pterinea Thompsoni.
[f] Pinna flabelliformis, was Pinna costata.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
ATRACHIA—*continued.*							
Pecten exiguus.	M'C. xv. 11.	.	*	.	.	Rahoran, *common*.	
,, fallax.	M'C. xiv. 2.	.	**	*	.	Abbey Bay, Malahide, Millecent.	7
,, filatus.	M'C. xiv. 10.	.	.	*	.	Millecent.	
,, flabellulum.	M'C. xv. 17.	.	.	*	.	Tornaroan.	
,, flexuosus.	M'C. xviii. 1.	.	.	***	.	Ballygasey, Armagh, Tonyshandeny.	
,, Forbesii.	M'C. xv. 20.	.	.	**	.	Millecent, Blacklion.	
,, gibbosus.	M'C. xviii. 5.	.	*	**	.	Ballinglen, Blacklion, Howth.	
,, granosus.	Phil. G. Y.	.	*	**		Abbey Bay, Killymeal, Millecent.	6
,, granulosus.	Phil. P. F.	.	*	*	*	Clonea, Ballyconnell, Carrownanalt.	
,, Hardingii.	M'C. xv. 18.	.	**	.	.	Bruckless, Lisnapaste.	
,, hians.	M'C. xvi. 6.	.	.	*	.	Millecent.	
,, incrassatus.	M'C. xvi. 1.	.	**	*	.	Bruckless, Bundoran, Easky.	
,, inornatus.	Phil. G. Y.	.	*	*	.	Ballinglen, Cork.	
,, intercostatus.	M'C. xviii. 4.	.	.	**		Killymeal, *abundant*, Little Island.	
,, interstitialis.	Phil. G. Y.	.	*	**	.	Ballintrillick, Knockninny, Killy-	6
,, irregularis.	M'C. xv. 8.	.	**	.	.	Cullion, Rahoran. [meal.	
,, Jonesii.	M'C. xvi. 10.	.	.	*		Blacklion, *rare*. [onny.	
,, Knockonniensis.	M'C. xvii. 4.	.	***	.	.	Larganmore, Abbey Bay, Knock-	
,, lelotis.	M'C. xv. 21.	.	*	*	.	Bundoran, Manorhamilton.	
,, macrotis.	M'C. xvi. 13.	.	*	*	.	Bruckless, Manorhamilton.	
,, megalotis.	M'C. xiv. 7.	.	*	**	.	Bundoran, Howth, Little Island.	
,, meleagrinoides.	M'C. xvi. 3.	.	.	*	.	Millecent.	
,, micropterus.	M'C. xv. 12.	.	**	.	.	Kildress, Killycloghy.	
,, mundus.	M'C. xvii. 5.	.	*	*	.	Lisnapaste, Clonalvy.	
,, Murchisoni.	M'C. xviii. 3.	.	*	**	.	Lisnapaste, Cregg, Tankardstown.	
,, orbiculatus.	M'C. xiv. 8.	.	*	*	.	Ballintrillick, Manorhamilton.	
,, Ottonis.	Port. 36. 10.	*	.	.	.	Drumkeeran.	
,, ovatus.	M'C. xiv. 11.	.	.	*	.	Ardagh.	
,, pera.	M'C. xv. 19.	.	.	*	.	Killalla, *common*.	
,, planicostatus.	M'C. xiv. 6.	.	.	*	.	Little Island.	
,, planoclathratus.	M'C. xvi. 2.	.	*	.	.	Bundoran.	
,, plicatus.	Sow. M. C.	.	*	*	*	Ballyduff, Mullawornia, Corry.	3
,, polytrichus.	Phil. P. F.	.	***	.	.	Bruckless, Lisnapaste, Ballintrillick.	
,, quinquelineatus.	M'C. xvii. 6.	.	*	.	.	Mohill,	
,, rugulosus.	M'C. xvii. 7.	.	*	.	.	Doorin.	
,, sclerotis.	M'C. xvi. 4.	.	*	.	.	Bundoran.	
,, Sedgwickii.	M'C. xiv. 4.	.	.	*	.	Little Island.	
,, segregatus.	M'C. xvii. 3.	.	.	*	.	Manorhamilton.	
,, semicircularis.	M'C. xvii. 10.	*	*	.	.	Bruckless, Lisnapaste.	
,, semicostatus.	Port. 36. 9.	.	.	*	.	Tyrone.	
,, semistriatus.	M'C. xvii. 9.	.	*	**	.	Mullaghfarry, Malahide, Ardagh.	
,, serratus.	M'C. xvii. 8.	.	*	.	.	Lisnapaste, *common*.	
,, simplex.	Phil. G. Y.	.	*	*	.	Cullion, *common*, Cork.	
,, Sowerbii.	M'C. xiv. 7.	.	*	**	.	Bundoran, Millecent, Ballyduff.	6
,, spinulosus.	M'C. xvii. 1.	.	*	.	.	Bruckless, *common*.	
,, tabulatus.	M'C. xvi. 12.	.	*	.	.	Ballintrillick, *common*.	
,, transversus.	Phil. P. F.	.	*	.	.	Clonea.	
,, tripartitus.	M'C. xvi. 8.	.	.	*	.	Killymeal.	
,, undulatus.	M'C. xvii. 12.	.	*	.	.	Lisnapaste. [nanalt.	
,, variabilis.	M'C. xvi. 7.		*	*	*	Bundoran, Manorhamilton, Carrow-	
Monotis æqualis.	M'C. xv. 1.	.	*	.	.	Cullion.	
BRACHIOPODA.							
Orbicula cincta.	Port. 32. 15.	.	*	.	.	Benburb.	
,, nitida.	Phil. G. Y.		*	.	*	Bundoran, Culkagh.	
,, quadrata.	M'C. xx. 1.	.	*	.	.	Rahan's Bay.	
,, trigonalis.	M'C. xx. 2.	.	*	.	.	Lisnapaste.	
ATHYRIDÆ.							
Crania vesiculosa.	M'C. xx. 3.	.	.	*	.	Millecent.	
Calceola sandalina.	Phil. P. F.	.	.	*	.	Ballyduff.	
Producta aculeata.	Sow. M. C.	.	*	**	.	Lisnapaste, Howth, Old Leighlin.	7
,, antiquata.	Sow. M. C.	.	*	**	.	Lisnapaste, Millicent, Tankardstown.	27
,, aurita.	Phil. G. Y.	.	.	***	.	Cookstown, Lackagh, Millicent.	12
,, caperata[a].	Phil. P. F.	*	**	.	.	Hook, Larganmore, Malahide.	10

[a] Producta caperata, was Leptæna caperata.

Name.	Authority.	O. R. S.	Cal. St.	Limest.	Coal.	Localities.	Other localities.
BRACHIOPODA—*continued.*							
Producta comoides.	Sow. M. C.	.	.	**	*	Killymeal, Little Island, Glenbane.	10
,, concinna[a].	Phil. G. Y.	*	*	*	.	Hook, Lisnapaste, Killymeal.	49
,, corrugata.	M'C. xx. 13.	.	*	**	.	Larganmore, Millecent, Little Island.	16
,, costeliata.	M'C. xx. 15.	.	.	*	.	Old Leighlin.	
,, Edelburgensis.	Phil. G. Y.	.	.	***	.	Tornaroan, Ballykea, Raheendoran.	3
,, elegans.	M'C. xviii. 13.	.	*	**	.	Bruckless, Cornacarrow, Millecent.	9
,, fimbriata.	Phil. G. Y.	.	*	**	.	Bundoran, Tornaroan, Little Island.	13
,, flexistria.	M'C. xx. 16.	.	.	*	.	Millecent.	
,, fragraria[b].	Phil. P. F.	.	**	*	.	Poulscadden, Clonea, Ardclogh.	
,, gigantea.	Sow. M. C.	.	.	***	.	Drumreagh Etra, Castle Espie, Armagh.	
,, granulosa.	Phil. G. Y.	.	.	***	.	Knockninny, Killukin, Millecent.	
,, hemispherica[c].	Sow. M. C.	.	*	**	.	Lisnapaste, Lackagh, Little Island.	40
,, intermedia.	M'C. xx. 4.	.	.	*	.	Millecent.	
,, interrupta[d].	Sow. G. T.	.	*	.	.	Ballinacourty.	
,, lasciniata.	M'C. xx. 12.	.	.	**	.	Millecent, Ballyduff.	
,, latissima.	Phil. G. Y.	.	*	**	.	Lisnapaste, Killymeal, Raheendoran.	9
,, laxispina.	Phil. G. Y.	.	.	***	.	Castle Espie, Salmon, Ballinacourty.	5
,, lirata.	Phil. G. Y.	.	*	**	.	Lisnapaste, Howth, Ballyduff.	
,, lobata.	Phil. G. Y.	.	*	**	.	Bruckless, Millecent, Tankardstown.	
,, longispina.	Sow. M. C.	.	**	*	.	Lisnapaste. Mohill, Howth.	
,, margaritacea.	Phil. G. Y.	.	**	*	.	Lisnapaste, Bundoran, Millecent.	5
,, Martini.	Sow. M. C.	.	.	***	.	Tornaroan, Cookstown, Millecent.	15
,, maxima.	M'C. xix. 12.	.	.	**	.	Mullaghfin, Cregg.	
,, membranacea[e].	Phil. P. F.	.	**	.	.	Lisnapaste, Ballinacourty.	
,, mesoloba.	Phil. G. Y.	.	.	***	.	Cornacarrow, Millecent, Little Island.	18
,, muricata.	Phil. G. Y.	.	.	*	.	Moore.	
,, ovalis.	Phil. G. Y.	.	*	**	.	Bundoran, Ballyduff, Carrigaline.	
,, pectinoides.	Phil. G. Y.	.	*	**	.	Abbey Bay, Millecent, Ballyduff.	8
,, prælonga[f].	Sow. G. T.	.	***	.	.	Lisnapaste, Toberelathan, Clonea.	
,, pugilis.	Phil. G. Y.	.	*	**	.	Lisnapaste, Malahide, Old Leighlin.	22
,, punctata.	Phil. G. Y.	.	*	**	.	Bundoran, Millecent, Carrigaline.	38
,, pustulosa.	Phil. G. Y.	.	*	**	.	Lisnapaste, Millecent, Tankardstown.	35
,, quincuncialis.	Phil. G. Y.	.	*	**	.	Lisnapaste, Millecent, Little Island.	20
,, rugata.	Phil. G. Y.	.	.	***	.	Blacklion, Millecent, Ballinacourty.	4
,, scabricula.	Phil. G. Y.	.	*	**	.	Lisnapaste, Millecent, Little Island.	29
,, scotica[g].	Phil. G. Y.	.	*	**	.	Bundoran, Millecent, Little Island.	35
,, setosa.	Phil. G. Y.	*	*	*	*	Hook, Bundoran, Millecent, Culkagh.	35
,, spinosa.	Sow. M. C.	.	**	*	*	Bruckless, Malahide, Drumdoe.	9
,, spinulosa.	Phil. G. Y.	.	.	.	.	Locality lost.	
,, striata[h].	Phil. G. Y.	.	.	*	.	Ardagh.	
,, subaculeata[i].	Ver. B. S. G. F.	.	**	.	.	Lisnapaste, Rahoran.	
,, sulcata.	Phil. G. Y.	.	*	**	.	Lisnapaste, Malahide, Carrigaline.	27
,, tortilis.	M'C. xx. 14.	.	*	.	.	Tullynagaigy.	
Leptagonia[j] analoga.	Phil. G. Y.	.	**	*	.	Ring, Currens, Millicent.	48
,, depressa.	Sow. M. C.	.	.	*		Millecent.	
,, multirugata.	M'C. xviii. 12.	.	.	*	.	Millecent.	
,, nodulosa[k].	Phil. P. F.	.	***	.	.	Mohill, Currens, Kilnamack.	
,, plicatilis.	Phil. G. Y.	.	.	***	.	Armagh, Salmon, Little Island.	7
,, rugosa[l].	Phil. P. F.	.	*	.	.	Ballinacourty.	
Leptæna convoluta.	Phil. P. F.	.	***	.	.	Lisnapaste, Hook, Ballinacourty.	
,, crassistria.	M'C. xx. 10.	.	***	.	.	Abbey Bay, Bundoran, Manorhamilton. [Bay.	
,, Dalmaniana.	M'C. xx. 7.	.	***	.	.	Lisnapaste, St. John's Point, Abbey	
,, gibberula.	M'C. xx. 11.	.	*	.	.	Lisnapaste.	
,, Hardrensis[m].	Phil. P. F.	.	*	*	*	Lisnapaste, Ballyduff, Cahernanalt.	
,, lata.	Sow. S. S.	.	*	.	.	Bruckless.	
,, multidentata.	M'C. xx. 8.	.	*	*	.	Ballybodonnel, St. John's Point.	

[a] Professor Haughton has lately obtained at Hook Point, in yellow sandstone, Lithodomus dactyloides, Sanguinolites sulcatus, Orthis crenistria, Atrypa pleurodon, Producta caperata, P. setosa, and P. concinna, which I have marked in the Old Red Sandstone column, some of them not having been found in that division before.

[b] Producta fragraria, was Leptæna fragraria.
[c] Producta hemispherica, was Producta aurita.
[d] Producta interrupta, was Leptæna interrupta.
[e] Producta membranacea, was Leptæna membranacea.
[f] Producta prælonga, was Leptæna prælonga.
[g] Producta scotica, was P. aurita.
[h] Producta striata, was Pinna inflata.
[i] Producta subaculeata, was Leptæna subaculeata.
[j] Leptagonia analoga, was Producta analoga.
[k] Leptagonia nodulosa, was Leptæna nodulosa.
[l] Leptagonia rugosa, was Leptæna rugosa.
[m] Leptæna Hardrensis, was Orthis Hardrensis.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
BRACHIOPODA—*continued.*							
Leptæna papyracea.	M'C. xxii. 2.	.	.	.	*	Courtlough, Castlecomer.	
,, perlata.	M'C. xx. 9.	.	*	.	.	Rahoran, *very abundant.* [courty.	
,, plicata[a].	Phil. P. F.	.	***	.	.	Lisnapaste, Ballinglen, Ballina-	
,, sericea.	Sow. S. S.	.	***	.	.	Lisnapaste, *abundant*, Clonea, Hook.	
,, serrata.	M'C. xviii. 10.	.	.	*	.	Millecent.	
,, sordida[b].	Sow. G. T.	.	***	.	.	Lisnapaste, Currens, Clonea.	8
,, tuberculata.	M'C. xx. 5.	.	.	*	.	Millecent.	
,, volva.	M'C. xviii. 14.	.	**	*	.	Bundoran, Hook, St. Doulough's.	
Orthis arachnoidea.	Phil. P. F.	.	**	*	.	Tinnycahill, Ring, Millecent.	19
,, arcuata.	Phil. P. F.	.	***	.	.	Lisnapaste, Toberelathan, Clonea.	4
,, Bechei.	M'C. xxii. 3.	.	*	.	.	Whiting Bay.	
,, caduca.	M'C. xxii. 6.	.	*	.	.	Rahoran, *seventeen specimens.*	
,, circularis.	M'C. xx. 19.	.	*	.	.	Lisnapaste.	
,, comata.	M'C. xxii. 5.	.	*	.	.	Currens.	
,, compressa.	Phil. P. F.	.	.	*	.	Castle Espie.	
,, connivens[c].	Phil. G. Y.	.	.	*	.	Little Island.	
,, crenistria.	Phil. G. Y.	*	*	*	.	Hook, Bundoran, Ballyduff.	83
,, cylindrica.	M'C. xxii. 1.	.	.	*	.	Castle Espie.	
,, divaricata.	M'C. xx. 17.	.	.	**	.	Millicent, Ballyduff.	
,, filiaria[d].	Phil. G. Y.	.	**	*	.	Bruckless, Malahide, Old Leighlin.	11
,, gibbera[e].	Port. / M'C. xviii. 9.	.	.	*	.	Cornagrade. [courty.	
,, granulosa.	Phil. P. F.	.	***	.	.	Lisnapaste, Poulscadden, Ballina-	
,, interlineata.	Phil. P. F.	.	***	.	.	Lisnapaste, Poulscadden, Currens.	16
,, Kellii.	M'C. xxii. 4.	.	*	*		Aghintain, Annaghilla, *abundant.*	
,, latissima.	M'C. xx. 20.	.	*	*	.	Rahan's Bay, St. John's Point.	
,, longisulcata.	Phil. P. F.	.	*	*	.	Ballinacourty, Ballyduff.	
,, orbicularis.	Sow. S. S.	.	**	*	.	Lisnapaste, Kilbride, Ardagh.	
,, papillionacea[f].	Phil. G. Y.	.	*	**	.	Bundoran, Termon, Millecent.	21
,, parallella.	Phil. P. F.	.	***	.	.	Lisnapaste, Bundoran, Clonea.	14
,, quadrata.	M'C. xx. 18.	.	*	.	.	Ballintrillick.	
,, radialis.	Phil. G. Y.	.	*	*	.	Stridagh Point, Ardagh.	
,, resupinata.	Phil. P. F.	.	*	**	.	Bundoran, Cookstown, Millecent.	25
,, semicircularis.	Phil. P. F.	.	***	.	.	Bruckless, Currens, Ballinacourty.	5
,, sulcata.	M'C. xx. 6.	.	***	.	.	Bruckless, Ballintrillick, Currens.	
,, tenuistriata.	Sow. G. T.	.	***	.	.	Lisnapaste, Currens, Shanbally.	
,, umbraculum.	Port. 37. 5.	.	*	*	.	Abbeylands, Enniskillen.	
DELTHYRIDÆ.							
Spirifer aperturata.	Phil. P. F.	.	***	.	.	Lisnapaste, Clonea, Ardoe.	
,, attenuata.	Phil. G. Y.	.	*	**	.	Lisnapaste, Cornacarrow, Millecent.	20
,, bicarinata.	M'C. xxii. 10.	.	.	*	.	Millecent.	
,, bisulcata.	Sow. M. C.	.	*	**	.	Ballintrillick, Millecent, Little Island.	11
,, calcarata.	M'C. xxi. 3.	.	**	*	.	Lisnapaste, Riniskiddy, Little Island.	16
,, choristites[g].	Von Buch.	.	.	*	.	Little Island, *abundant.*	
,, clathrata.	M'C. xix. 9.	.	*	.	.	Lisnapaste.	
,, convoluta.	Phil. G. Y.	.	*	.	.	Lisnapaste.	
,, costata.	Sow. G. T.	.	**	.	*	Abbey Bay, Currens, Cahernanalt.	
,, crispa.	Sow. S. S.	.	***	.	*	Lisnapaste, Malahide, Carrownanalt.	5
,, decemcostata.	M'C. xxii. 9.	.	.	*	.	Millecent.	
,, disjuncta.	Phil. P. F.	.	**	*	.	Lisnapaste, Currens, Ardclogh.	17
,, extensa.	Sow. G. T.	.	*	.	.	Currens,	
,, furcata.	M'C. xxii. 12.	.	.	*	.	Millecent.	
,, fusiformis.	Phil. G. Y.	.	*	*	.	Killinamack, Millecent.	
,, gigantea.	Phil. P. F.	.	**	*	.	Lisnapaste, Bundoran, Tullyoran.	10
,, grandæva.	Phil. P. F.	.	***	.	.	Lisnapaste, Currens, Shanbally.	
,, inornata.	Sow. G. T.	.	***	.	.	Toberelathan, Curragh, Shanbally.	
,, insculptus.	Phil. G. Y.	.	.	.	.	Ireland.	
,, megaloba.	Phil. P. F.	.	**	.	.	Currens, Poulscadden.	
,, mesomala.	Phil. P. F.	.	.	.	.	Locality lost.	
,, minima.	Sow. M. C.	.	*	.	.	Clonkeeffy, Rathcline, Old Leighlin.	3
,, octoplicata.	Sow. M. C.	.	**	*	.	Bundoran, Carrowmably, Cregg.	5

[a] Leptæna plicata, was Orthis plicata.
[b] Leptæna sordida, was Orthis sordida.
[c] Orthis connivens, was Spirifera connivens.
[d] Orthis filiaria, was Spirifera filiaria.
[e] Orthis gibbera, was Atrypa gibbera.
[f] Orthis papillionacea, was Spirifera papillionacea.
[g] Spirifer choristites, was Choristites mosquensis.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
BRACHIOPODA—*continued.*							
Spirifer ornithoryncha.	M'C. xxi. 2.	.	.	*	.	Millecent.	
„ ostiolata.	Phil. P. F.	.	**	*	.	Malahide, Clonea, Bundoran.	10
„ partita.	Port. T. 38. 3.	*	.	.	.	Kildress.	
„ princeps.	M'C. xxi. 1.	.	.	*	.	Ardclogh.	
„ pulchella.	Sow. G. T.	.	.	.	.	Locality lost.	
„ quinqueloba.	M'C. xxii. 7.	.	.	*	.	Ardagh.	
„ rhomboidea.	Phil. G. Y.	.	*	**	.	Lisnapaste, Knockninny, Millicent.	8
„ rotundata.	Phil. G. Y.	.	*	**	.	Malahide, Millecent, Little Island.	7
„ rudis.	Phil. P. F.	.	*	*	.	Ballinacourty, Howth.	
„ speciosa.	Phil. P. F.	.	***	.	.	Bundoran, Currens, Clonea.	13
„ striata.	Sow. M. C.	.	.	***	.	Rathcline, Millecent, Little Island.	4
„ transiens.	M'C. xix. 14.	.	.	*	.	Clonalvy, *abundant.*	
„ trigonalis.	Sow. M. C.	.	*	**	.	Larganmore, Milverton, LittleIsland.	4
„ urii[a].	Phil. P. F.	.	***	.	.	Lisnapaste, Ballintrillick Poulscadden.	
Cyrtia cupidata[b].	Phil. G. Y.	.	*	**	.	Lisnapaste, Millecent, Ballyduff.	11
„ distans[b].	Sow. M. C.	.	**	*	.	Bundoran, Malahide, Millecent.	12
„ dorsata.	M'C. xxii. 14.	.	.	*	.	Cork.	
„ laminosa.	M'C. xxi. 4.	.	*	**	.	Stridagh Point, Malahide, Hook.	5
„ linguifera[c].	Phil. P. F.	.	.	***	.	Ardagh, Rathmoyle, Millecent.	5
„ mesogonia.	M'C. xxii. 13.	.	.	**	.	Millecent, Hook.	
„ nuda[b].	Phil. P. F.	.	**	.	.	Clonea, Riniskiddy.	
„ semicircularis[b].	Phil. G. Y.	.	**	*	.	Mohill, Malahide, Slane.	3
„ senilis[b].	Phil. G. Y.	.	.	**	.	Cookstown, Armagh.	
„ simplex[b].	Phil. P. F.	.	*	**	.	Lisnapaste, Malahide, Hook.	3
„ subconica[b].	Phil. P. F.	.	*	.	.	Bundoran.	
Martinia[d] decora.	Phil. G. Y.	.	*	**	.	Clonea, Mullaghboy, Mullaghfin.	
„ elliptica.	Phil. G. Y.	.	**	*	.	Ballybodonnel, Malahide, Millecent.	
„ glabra.	Phil. G. Y.	.	*	*	*	Malahide, Little Island, Carrownanalt.	11
„ mesoloba.	Phil. G. Y.	.	.	***	.	Laracor, Millecent, Tankardstown.	3
„ oblata.	Phil. G. Y.	.	.	***	.	Cornacarrow, Millecent, Little Island.	6
„ obtusa.	Sow. M. C.	.	*	**	.	Malahide, Millecent, Little Island.	7
„ phalæna.	Phil. P. F.	.	**	*	.	Lisnapaste, Clonea, St. Doulough's.	
„ plebeia.	Phil. P. F.	.	*	**	.	Lisnapaste, Mullaghfin, Millecent.	16
„ protensa.	Phil. P. F.	.	.	.	.	Locality lost.	
„ rhomboidalis.	M'C. xxii. 11.	.	.	*	.	Cork.	
„ strigocephaloides.	M'C. xxii. 8.	.	*	*	.	Lisnapaste, Old Leighlin.	
„ symmetrica.	Phil. G. Y.	.	*	*	.	Mullaghfin, Little Island.	
Reticularia[e] imbricata.	Phil. G. Y.	.	*	**	.	Lisnapaste, Ardagh, Little Island.	8
„ lineata.	Phil. G. Y.	.	*	**	.	Larganmore, Millecent, Little Island.	8
„ microgemma.	Phil. P. F.	.	**	*	.	Bundoran, Malahide, Hook.	3
„ reticulata.	M'C. xix. 15.	.	.	***	.	Tornaroan, Armagh, Bannaghagole.	
„ striatella.	M'C. xix. 13.	.	.	*	.	Termon.	
Brachythyris[f] duplicicosta.	Phil. G. Y.	.	*	*	*	Lisnapaste, Malahide, Mullaghfin.	6
„ exarata.	Flem. Br. An.	.	*	**	.	Ballintrillick, Rathcline, Old Leighlin.	
„ hemispherica.	M'C. xix. 10.	.	.	*	.	Armagh.	
„ integricosta[f].	Phil. G. Y.	.	*	**	.	Bundoran, Millecent, Little Island.	6
„ linguifera[f].	Phil. G. Y.	.	.	.	.	Locality lost.	
„ ovalis.	Phil. G. Y.	.	*	*	.	Ballinacourty, Ballyduff.	
„ pinguis.	Sow. M. C.	.	*	**	.	Cullion, St. Doulough's, Millecent.	15
„ planata.	Phil. G. Y.	.	*	**	.	Bundoran, Ardclogh, Little Island.	
„ planicostata.	M'C. xxi. 5.	.	*	**	.	Bruckless, Killymeal, Bannaghagole.	6
Athyris[g] concentrica.	Von Buch.	.	**	*	.	Larganmore, Malahide, Hook.	8
„ decussata[h].	Phil. P. F.	.	**	*	.	Lisnapaste, Carrowmably, Tornaroan.	12
„ depressa.	M'C. xviii. 7.	.	***	.	.	Lisnapaste, Malahide, Hook.	
„ expansa[h].	Phil. G. Y.	.	**	*	.	Bruckless, Drumdoe, Milverton.	
„ fimbriata[h].	Sow. M. C.	.	**	*	.	Lisnapaste, Bundoran, Boyle.	
„ glabistria[h].	Phil. G. Y.	.	*	**	.	Bundoran, Millecent, Little Island.	6
„ globularis[h].	Phil. G. Y.	.	*	**	.	Larganmore, Millecent, Little Island.	10
„ hispida[i].	Sow. G. T.	.	***	.	.	Kildress, Carrowmably, St. John's.	
„ planosulcata[h].	Phil. G. Y.	.	*	*	*	Lisnapaste, Rathgillen, Culkagh.	

[a] Spirifer urii, was Spirifera unguiculus.
[b] Cyrtia, was Spirifera.
[c] Cyrtia linguifera, was Spirifera ostiolata.
[d] Martinia, was Spirifera.
[e] Reticularia, was Spirifera.
[f] Brachythyris, was Spirifera.
[g] Athyris concentrica, was Terebratula concentrica.
[h] Athyris, was Spirifera.
[i] Athyris hispida, was Atrypa hispida.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
BRACHIOPODA—*continued.*							
Athyris squamosa[a].	Phil. G. Y.	.	*	**	.	Lisnapaste, Hook, Moore.	
,, triloba.	M'C. xx. 21.	.	.	*	.	Drumscraw.	
Actinoconchus paradoxus.	M'C. xxi. 6.	.	.	***	.	Blacklion, Millecent, Little Island.	
Atrypa[b] acuminata.	Phil. G. Y.	.	.	***	.	Mullaghfin, Millecent, Little Island.	
,, angularis.	Phil. P. F.	.	*	.	.	Ballinglen, *three specimens.*	
,, anisodonta.	Phil. P. F.	.	*	*	.	Rahoran, Cork.	
,, aspera[c].	Sow. G. T.	.	*	.	.	Poulscadden.	
,, bifera.	Phil. P. F.	.	**	*	.	Malahide, Currens, Millecent.	
,, canalis.	Sow. S. S.	*	.	.	.	Kildress.	
,, compta.	Phil. P. F.	.	**	.	.	Kilcummin, Ballinglen.	
,, cordiformis.	Sow. M. C.	.	.	**	.	Millecent, Little Island.	
,, desquamata.	Phil. P. F.	.	**	.	.	Clonea, Ballinacourty.	
,, excavata.	Phil. G. Y.	.	.	**	.	Ardagh, *abundant*, Ardclogh.	
,, expansa.	Phil. G. Y.	.	.	.	.	Ireland.	
,, fallax.	Phil. G. Y.	*	**	.	.	Hook, Cultra, Bruckless, *common.*	13
,, ferita.	Phil. P. F.	.	**	*	.	Ballycastle, *Co. Antrim*, Claraghmore, Millecent.	.
,, flexistria.	Phil. G. Y.	.	*	**	.	Rahoran, Knockninny, Millecent,	4
,, gregaria.	M'C. xxii. 18.	.	**	.	.	Ballinglen, Kilbride, White River.	
,, hastata.	Phil. G. Y.	.	*	**	.	Lisnapaste, Millecent, Little Island.	18
,, indentata.	Sow. G. T.	.	**	.	.	Lisnapaste, *common*, Larganmore.	
,, insperata.	Phil. P. F.	.	**	.	.	Clonea, Ballinacourty,	
,, isorhynca.	M'C. xviii. 8.	.	.	*	.	Clare.	
,, juvenis.	Phil. P. F.	.	**	.	.	Bruckless, Toberelathan.	
,, lachryma.	Sow. G. T.	.	*	*	.	Malahide, Howth, *common in one bed.*	
,, lateralis.	Sow. M. C.	.	.	.	.	Ireland.	
,, laticliva.	M'C. xxii. 16.	.	.	*	.	Cookstown.	
,, laticosta.	Phil. P. F.	.	***	.	.	Kildress, Cultra, Rahoran.	4
,, Mantiæ.	Sow. M. C.	.	.	.	.	Ireland.	
,, nana.	M'C. xxii. 19.	.	*	.	.	Rahoran, *common.*	
,, oblonga.	Sow. G. T.	.	*	.	.	Clonea,	
,, obtusa.	M'C. xxii. 20.	.	.	*	.	Milverton, *common.*	
,, planosulcata.	Phil. G. Y.	.	.	.	.	Ireland.	
,, platyloba.	Sow. M. C.	.	.	*	.	Little Island.	
,, pleurodon.	Phil. G. Y.	.	**	*	.	Malahide, Toberelathan, Millecent.	4
,, prisca[d].	Sow. M. C.	.	*	.	.	Shanbally.	
,, proava.	Phil. G. Y.	.	*	.	.	Malahide.	
,, pugnus.	Phil. G. Y.	.	.	***	.	Ardagh, Millecent, Little Island.	7
,, radialis.	Phil. G. Y.	.	**	*	.	Bruckless, Malahide, Millecent.	4
,, reniformis.	Phil. G. Y.	.	*	**	.	Lisnapaste, Millecent, Little Island.	
,, Roissyi.	Ver. B. S. G. F.	.	.	.	.	Dublin.	
,, sacculus.	Phil. G. Y.	.	*	**	.	Ardagh, Millecent, Little Island.	3
,, semisulcata.	M'C. xxii. 15.	.	.	.	***	Culkagh, Walterstown, Ballintree.	
,, striatula.	Sow. G. T.	.	***	.	.	Clonea, Curragh, Rinaskiddy.	
,, sublobata.	Port.	*	.	.	.	Kildress.	
,, sulcirostris.	Phil. G. Y.	.	**	*	.	Bruckless, Ballintrillick, Knockninny.	7
,, triangularis.	Sow. G. T.	.	.	*	.	Little Island.	
,, triplex.	M'C xxii. 17.	*	.	.	.	Kildress.	
,, ventilabrum.	Phil. G. Y.	.	*	**	.	Bundoran, Ardagh, Millecent.	5
,, virgoides.	M'C. xxii. 21.	.	.	*	.	Cork.	
Seminula pentacdra[e].	Phil. G. Y.	.	**	*	.	Kilcummin, Ballintrillick, Millecent.	
,, pisum.	Phil. G. Y.	.	.	***	.	Malahide, Howth, Laracor.	
,, rhomboidea.	Phil. P. F.	.	.	***	.	Cookstown, Blacklion, Howth.	
CRUSTACEA.							
Astacus Phillipsii.	M'C. xxiii. 1.	.	*	.	.	Hook.	
Calymene granulata.	Phil. P. F.	.	**	.	.	Clonea, Ballinacourty.	
,, lævis.	Phil. P. F.	.	*	.	.	Clonea.	
,, Latreillii.	Phil. P. F.	.	*	.	.	Clonea.	
Griffithides calcaratus[f].	M'C. iv. 3.	.	.	*	.	Roughan.	
,, globiceps.	Phil. G. Y.	.	.	**	*	Millecent, Howth, Carrownanalt.	
,, granuliferus.	Phil. G. Y.	.	.	*	.	Florence Court.	
,, longiceps.	Port. 11. 7.	.	*	.	.	Kildress.	

[a] Athyris, was Spirifera.
[b] Atrypa generally was Terebratula.
[c] Atrypa aspera, was Atrypa squamosa.
[d] Atrypa prisca, was Terebratula affinis.
[e] Seminula, was Terebratula.
[f] Griffithides, was Asaphus.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
CRUSTACEA—*continued.*							
Griffithides longispinus.	Port. 24. 12.	.	.	*	.	Co. Tyrone, Co. Kildare. [glogh.	
,, obsoletus.	Phil. G. Y.	.	**	*	.	Lisnapaste, Ballintrillick, Cartrona-	
,, platyceps.	Port. 11. 8.	.	.	*	.	Tyrone.	
Asaphus quadrilimbus.	Phil. G. Y.	.	.	*	.	Ireland.	
,, seminifera.	Phil. G. Y.	.	.	.	.	Ireland.	
Phillipsia cælata[a].	M'C. iv. 4.	.	.	*	.	Killymeal.	
,, Colei.	M'C. iv. 6.	.	*	.	.	Lisnapaste	
,, discors.	M'C. iv. 7.	.	.	*	.	Millecent.	
,, gemmulifera.	Phil. G. Y.	.	*	*	*	Lisnapaste, Millecent, Carrownanalt.	
,, Jonesii.	Port. 11. 3.	.	.	**	.	Armagh, Ballygasey,	
,, Kellii.	Port. 11. 1.	.	.	**	.	Cookstown, Millecent.	
,, Macoyii.	Port. 11. 6.	.	.	*	.	Millecent.	
,, mucronata.	M'C. iv. 5.	*	.	.	.	Kildress.	
,, quadriserialis.	M'C. iv. 8.	.	.	*	.	Millecent.	
,, truncatula.	Phil. G. Y.	.	**	.	*	Lisnapaste, Currens, Carrownanalt.	
Dithyrocaris Colei.	Port. 12.	.	*	.	.	Aghnaglogh.	
,, orbicularis.	Port. p. 316.	.	**	.	.	Whitewater River, Aghnaglogh.	
,, Scouleri.	M'C. xxiii. 2.	.	*	.	.	Aghnaglogh.	
,, tenuistriatus.	M'C. xxiii. 3.	.	.	*	.	Little Island.	
Limulus trilobitoides.	Buck. T. 46. 3.	.	*	.	.	Moyola River.	
Entomoconchus Scouleri.	M'C. xxiii. 4.	.	.	***	.	Blacklion, Millecent, Little Island.	
Daphnia primæva.	M'C. xxiii. 5.	.	*	.	.	Rahoran.	
Bairdia curtus.	M'C. xxiii. 6.	.	.	**	.	Granard, Ardclogh.	
,, gracilis.	M'C. xxiii. 7.	.	.	**	.	Armagh, Ardagh.	
Cythere amygdalina.	M'C. xxiii. 8.	.	***	.	.	Cultra, Dromard, Ballintrillick.	
,, arcuata.	M'C. xxiii. 9.	.	***	.	.	Cultra, Larganmore, Rahoran.	
,, bituberculata.	M'C. xxiii. 10.	.	***	.	.	Cultra, Corick, Dromard.	
,, costata.	M'C. xxiii. 11.	.	***	.	.	Cultra, Dromard, Rahoran.	
,, cornuta.	M'C. xxiii. 12.	.	**	*	.	Cultra, Larganmore, Raheendoran.	4
,, elongata.	M'C. xxiii. 13.	.	***	.	.	Cultra, Dromard, Rahoran.	
,, excavata.	M'C. xxiii. 14.	.	***	.	.	Cultra, Dromard, Rahoran.	
,, gibberula.	M'C. xxiii. 25.	.	***	.	.	Fallagloon, Abbeybay, Ballintrillick.	
,, Hibbertii.	M'C. xxiii. 15.	.	***	.	.	Fallagloon, Larganmore, Ballinglen.	
,, impressa.	M'C. xxiii. 16.	.	***	.	.	Cultra, Fallagloon, Leam.	4
,, inflata.	M'C. xxiii. 17.	.	**	*	.	Fallagloon, Poulscadden, Millecent.	12
,, inornata.	M'C. xxiii. 18.	.	***	.	.	Cultra, Fallagloon, Prughlish.	10
,, oblonga.	M'C. xxiii. 22.	.	***	.	.	Cultra, Fallagloon, Leam.	8
,, orbicularis.	M'C. xxiii. 19.	.	***	.	.	Fallagloon, Larganmore, Rahoran.	6
,, pusilla.	M'C. xxiii. 20.	.	***	.	.	Cultra, Corick, Dromard.	5
,, scutulum.	M'C. xxiii. 21.	.	***	.	.	Cultra, Dromard, Ballintrillick.	
,, spinigera.	M'C. xxiii. 23.	.	*	*	.	Ballintrillick, Armagh.	
,, trituberculata.	M'C. xxiii. 24.	.	*	.	.	Cultra.	
Cypris Scoto-Burdigalensis.	Port. 24. 13.	.	*	.	.	Derry, Tyrone.	
,, subrectus.	Port. T. 24. 13.	.	*	.	.	Derry, Tyrone,	
ANNELIDA.							
Serpula compressa.	Sow. M. C.	.	*	.	.	Bundoran.	
,, hexicarinata.	M'C. xxiii. 28.	.	**	.	.	Bundoran, Ballintrillick.	
,, parallela.	M'C. xxiii. 30.	.	***	.	.	Finner, Abbeybay, Ballintrillick.	
,, scalaris.	M'C. xxiii. 29.	.	*	.	.	Lisnapaste.	
,, socialis.	Port. T. 25. 9.	.	*	.	.	Clogher.	
,, subannulata.	Port. p. 363.	.	.	*	.	Kileeshil, Tyrone.	
,, subcincta.	Port. p. 362.	.	.	*	.	Armagh.	
Spirorbis caperatus.	M'C. xxiii. 26.	.	*	.	.	Hook.	
,, globosus.	M'C. iv. 10.	.	**	.	.	Ballymacan, Aghnaglogh.	
,, intermedius.	M'C. iv. 9.	.	*	.	.	Cultra.	
,, minutus.	Port. 12. 3.	.	*	.	.	Aghnaglogh.	
,, omphalodes.	Gold.	.	**	.	.	Cultra, Fallagloon.	
Spiroglyphus marginatus.	M'C. xxiii. 27.	.	*	.	.	Hook.	
Serpulites carbonarius.	M'C. xxiii. 32.	.	.	*	.	Manorhamilton.	
,, membranaceus.	M'C. xxiii. 31.	.	*	.	.	St. Doulough's, *in black slate.*	
Sabella antiqua.	M'C. iv. 11.	*	**	.	.	Kildress, Cullion, Abbeybay.	

[a] Phillipsia, was Asaphus.

Name.	Authority.	O. R. S.	Cal. St.	Limest.	Coal.	Localities.	Other localities.
ECHINODERMATA.							
Palechinus elegans.	M'C. xxiv. 2.	.	.	*	.	Hook.	
,, ellipticus.	Scouler MSS. xxiv. 3.	.	.	*	.	Millecent.	
,, gigas.	M'C. xxiv. 4.	.	**	*	.	Rahans Bay, St. John's Point, Hook.	
,, Koenigii.	M'C. xxiv. 19.	.	**	.	.	Rahans Bay, Finner.	
,, sphericus.	Scouler MSS. xxiv. 5.	.	.	*	.	Millecent.	
Echinocrinus[a] glabrispina.	Phil. G. Y.	.	***	.	.	Bundoran, Hook, Clonea.	
,, Munsterianus.	Kon. xxvii. 2.	.	.	.	.	Locality lost.	
,, triserialis.	M'C. xxvi. 1.	.	*	.	.	Kilycloghy.	
,, Uriib.	Flem. Br. An. M'C. xxvii. 1.	.	**	*	.	Tinnycahill, Bundoran, Manorhamilton.	8
,, vetustus[a].	Phil. G. Y.	.	.	**	.	Hook, Ardagh.	
Adelocrinus histrix.	Phil. P. F.	.	*	.	.	Ballinacourty.	
Pentremites Derbiensis.	Phil. G. Y.	.	*	*	.	Manorhamilton, Knockninny.	
,, ellipticus.	Sow. Z. J.	.	.	**	.	Manorhamilton, Howth.	
,, florealis[c].	Phil. P. F.	.	.	*	.	Blacklion.	
Perischodomus biserialis.	M'C. A. N. H.	.	.	*	.	Hook Head.	
Platycrinus anthelíontes.	Aus. M. Cr. 2. 3.	.	.	*	.	Hook Head.	
,, contractus.	Phil. G. Y.	.	*	.	.	Toberelathan.	
,, diadema.	M'C. A. N. H.	.	.	.	.	Fermanagh.	
,, elongatus.	Aus. Cr. 2. 2.	.	.	.	.	Hook Head.	
,, expansus.	M'C. xxv. 18. 19.	.	*	.	.	Finner	
,, gigas.	Phil. G. Y.	.	**	.	.	Malahide, Hook.	
,, granulatus.	Phil. G. Y.	.	*	.	.	Ballinacourty, *common*.	
,, interscapularis.	Phil. P. F.	.	**	*	.	Clonea, Ballinacourty, Howth.	
,, lasciniatus.	Phil. G. Y.	.	**	.	.	Finner, Hook.	
,, lævis.	Mill.	.	.	*	.	Hook, *common and very fine*.	
,, ornatus.	M'C. xxv. 1.	.	*	.	.	Hook.	
,, pileatus.	Aus. Cr. 2. 3.	.	.	.	.	Ireland.	
,, punctatus.	M'C. xxv. 15. 16. 17	.		*	.	St. John's Point.	
,, ragosus.	Phil. G. Y.	.	.	***	.	Derryvullan, Ardclogh, Howth.	
,, similis.	M'C. xxvi. 6.	.	*	.	.	Ballinacourty.	
,, spinosus.	Aus. Cr. 1. 2.	.	.	*	.	Hook Head.	
,, striatus.	Aus. Cr. 3. 3.	.	.	.	.	Hook Head.	
,, triacontadactylus.	M'C. xxv. 2 to 7.	.	*	.	.	Hook.	
,, trigentidactylus.	Aus. Cr. 3. 1.	.	.	*	.	Hook Head.	
,, tuberculatus.	Phil. G. Y.	.	*	.	.	Ballinacourty.	
Poteriocrinus abbreviatus.	Aus. Cr. 2. 4.	.	.	*	.	Hook Head.	
,, conicus.	Port. 16. 12.	.	.	*	.	Fermanagh.	
,, crassimanus.	M'C. A. N. H.	.	.	*	.	Hook Head.	
,, crassus.	Aus. Cr. 8. 3.	.	.	.	.	Ireland.	
,, dactyloides.	Aus. Cr. 10. 7.	.	.	*	.	Hook Head.	
,, gracilis.	M'C. xxv. 11 to 14.	.	*	.	.	Hook Head.	
,, granulosus.	Aus. Cr. 9. 2.	.	.	.	.	Ireland.	
,, impressus.	Phil. G. Y.	.	*	*	.	Malahide, Millecent.	
,, isacobus.	Aus. Cr. 8. 4.	.	.	*	.	Hook Head.	
,, quinquangularis.	Phil. G. Y.	.	.	.	.	Ireland.	
,, radiatus.	Aus. A. N. H.	.	.	*	.	Hook Head.	
,, rostratus.	Aus. A. N. H.	.	.	*	.	Hook Head.	
Taxocrinus macrodactylus[d].	Phil. G. Y.	.	***	.	.	Carrowmably, Clonea, Ballinacourty.	
,, Egertoni[e].	Phil. G. Y.	.	.	*	.	Florence Court.	
,, granulosus[e].	Phil. G. Y.	.	.	*	.	Enniskillen.	
,, polydactylus.	M'C. xxvi. 7.	.	*	.	.	Ballintrillick, *rare*.	
Cyathocrinus conicus.	Phil. G. Y.	.	.	.	.	Locality lost, Ireland (Morris). [nalt.	
,, ellipticus.	Phil. P. F.	.	**	.	*	Lisnapaste, Ballinacourty, Carrowa-	
,, geometricus.	Phil. P. F.	.	***	.	.	Currens, Ballinacourty, Curragh.	
,, inequidactylus.	M'C. xxvi. 8.	.	*	*	.	Malahide, Hook.	
,, macrocheirus.	M'C. xxv. 8. 9. 10.	.	*	.	.	Rahans Bay.	
,, megastylus.	Phil. P. F.	.	**	*	.	Lisnapaste, Mohill, St. Doulough's.	
,, ornatus.	Phil. G. Y.	.	.	*	.	Malahide.	
,, pinnatus.	Phil. P. F.	.	***	.	.	Lisnapaste, Larganmore, Clonea.	8
,, planus.	Bronn. 4. 6.	.	.	*	.	Belmore Mountain.	

[a] Echinocrinus, was Cidaris.
[b] Echinocrinus Urii, was Cidaris Benburbiensis.
[c] Pentremites florealis, was Pentremites ovalis.
[d] Tarocrinus, was Isocrinus.
[e] Taxocrinus, was Poteriocrinus.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
ECHINODERMATA—*continued.*							
Cyathocrinus quinquangularis.	Aus. Cr. 10. 2.	.	.	.	.	Ireland.	
,, radatus.	Aus. Cr. 10. 1.	.	.	.	.	Ireland.	
,, rostratus.	Aus. Cr. 9. 2.	.	.	.	.	Ireland. [trillick.	
,, variabilis.	Phil. P. F.	.	**	*	.	Larganmore, Ballinacourty, Ballin-	13
Rhodocrinus abnormis.	M'C. xxvi. 3.	.	.	*	.	Millecent.	
,, costatus.	Aus. A. N. H.	.	.	*	.	Hook Head.	
,, granulatus.	Aus. A. N. H.	.	.	*	.	Hook Head.	
,, verus.	Gold. 60. 3.	.	.	*	.	Howth.	
Gilbertsocrinus simplex.	Port. T. 16. 15.	.	.	*	.	Fermanagh.	
Actinocrinus aculeatus.	Aus. A. N. H.	.	.	.	.	Hook Head.	
,, cataphractus.	Aus. A. N. H.	.	.	*	.	Hook Head.	
,, constrictus.	M'C. xxvii. 3.	.	.	**	.	Manorhamilton, Chicken Hill.	
,, costus.	M'C. xxvi. 2.	.	.	*	.	Manorhamilton.	
,, decadactylus.	Port.	.	*	.	.	Tyrone.	
,, elephantinus.	Aus. A. N. H.	.	.	*	.	Hook Head.	
,, globosus.	Phil. G. Y.	.	.	.	.	Ireland.	
,, granulatus.	Aus. A. N. H.	.	.	.	.	Hook Head.	
,, icosidactylus.	Port. T. 15. 7.	.	.	*	.	Hook Head.	
,, lævis.	Gold. 59. 3.	.	.	*	.	Locality lost.	
,, lævissimus.	Aus. A. N. H.	.	.	*	.	Hook Head.	
,, longispinosus.	Aus. A. N. H.	.	.	*	.	Hook Head.	
,, polydactylus.	Phil. G. Y.	.	**	*	.	Hook, Ballinacourty, Millecent.	
,, pusillus.	M'C. xxvi. 4.	.	.	*	.	Malahide.	
,, tenuistriatus.	Phil. P. F.	.	**	.	*	Lisnapaste, Clonea, Carrownanalt.	
,, tesselatus.	Phil. G. Y.	.	*	.	.	Clonea. [cent.	
,, triacontadactylus.	Phil. G. Y.	.	**	*	.	Carrowmably, Manorhamilton, Mille-	8
Amphoracrinus[a] gigas.	Aus. M. Cr.	.	.	*	.	Derryvullan, *Fermanagh.*	
,, Gilbertsoni[b].	Aus. M. Cr.	.	*	.	.	Malahide.	
Synbathocrinus conicus.	Aus. Cr. 11. 5.	.	.	.	.	Hook Head.	
Phillipsocrinus caryocrinoides.	M'C. xxvi. 5.	.	*	.	.	Malahide, *rare.*	
Atocrinus Milleri.	M'C. xxv. 20.	.	*	.	.	Hook.	
ZOOPHYTA.							
Amplexus nodulsus.	Phil. P. F.	.	*	**	.	Clonea, Kilcommock, Millcent.	
,, Sowerbii.	Phil. G. Y.	.	.	***	.	St. John's Point, Millecent, Ballyduff.	17
,, tortuosus.	Phil. P. F.	.	*	**	.	Lisnapaste, Ballyduff, Tankardstown.	6
Turbinolopsis bina.	Phil. P. F.	.	**		.	Bruckless, Currens.	
,, celtica.	Phil. P. F.	.	***	.	.	Ballinglen, Killinamack, Clonea.	
,, pauciradialis.	Phil. P. F.	.	**	.	.	Currens, Ballinacourty.	
,, pluriradialis.	Phil. P. F.	.	**	.	.	Currens, Riniskiddy.	
Turbinolia expansa.	M'C. xxviii. 7.	.	.	*	*	Scraghy, Little Island.	
,, fungites.	Phil. G. Y.	.	**	*	.	Lisnapaste, Hook, Little Island.	50
Siphonophyllia cylindrica.	Sco. MSS. xxvii. 5.	.	*	**	.	Bundoran, Carlingford, Knocknarea.	22
Astræa aranea.	M'C. xxvii. 6.	.	.	*	.	Magheranore.	
,, crenularis[c].	Phil. G. Y.	.	.	***	.	Cookstown, Tumpher, Armagh.	
,, irregularis.	Port. T. 23. 4.	.	**	*	.	Mullaghtinny, Ballymacan, Easky.	
,, pentagona.	Phil. P. F.	.	*	*	.	Larganmore, Tornaroan.	
Lithostrotion[d] striatum.	Phil. G.Y.	.	.	***	.	Armagh, Athenry, Raheendoran.	12
Lithodendron[e] affine.	Phil. G. Y.	.	.	***	.	Drumscraw, Pulgulm, Ballyconnel.	7
,, cæspitosum[f].	Phil. G. Y.	.	.	***	.	Drumscraw, Millecent, Raheendoran.	7
,, coarctatum.	Port. T. 23. 5.	.	.	*	.	Cookstown.	
,, pauciradialis.	M'C. xxvii. 7.	.	.	*	.	Magheranore.	
,, sexdecimale.	Phil. G. Y.	.	*	**	.	Hook, St. John's Point, Howth.	
,, sociale.	Phil. G. Y.	.	*	**	.	Ballintrillick, Ballygasey, Roscom-	
Syringopora bifurcata.	Lons. S. S.	.	*	.	.	Poulscadden. [mon.	
,, catenata[g].	Lons. S. S.	.	***	.		Killaghtee, Lisnapaste, Ballinglen.	
,, geniculata.	Phil. G. Y.	.	*	**	.	Larganmore, Cornacarrow, Roscom-	11
,, laxa.	Phil. G. Y.	.	*	**	.	Bruckless, Killymeal, Kilmore. [mon.	

[a] Amphoracrinus gigas, was Actinocrinus amphora.
[b] Amphoracrinus, was Actinocrinus.
[c] Astræa crenularis, was Cyathophyllum crenulare.
[d] Lithostrotion striatum, was Cyathophyllum basaltiforme.
[e] Lithodendron affine, was Lithodendron longiconicum.
[f] Lithodendron cæspitosum, was Lithodendron fasciculatum.
[g] Syringopora catenata, was Syringopora reticulata.

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.	Other localities.
ZOOPHYTA—*continued.*							
Syringopora ramulosa.	Phil. G. Y.	.	**	*	.	Rahan's Bay, Malahide, Drumscraw	3
Aulopora campanulata.	M'C. xxvi. 15.	.	*	*	.	Malahide, Hook.	
,, gigas.	M'C. xxvii. 14.	.	*	.	.	Ballintrillick.	
Manon cribrosum.	Phil. P. F.	.	***	.	.	Bruckless, Hook, Clonea.	
Astreopora antiqua.	M'C. xxvi. 9.	.	*	.	.	Hook.	
Dictiaophyllia antiqua.	M'C. xxvi. 10.	.	*	.	.	Hook.	
Pleurodictyum problematicum.	Phil. P. F.	.	***	.	.	Lisnapaste, Clonea, Ballinacourty.	
Favosites capillaris.	Phil. G. Y.	.	.	***	.	Cornacarrow, Armagh, Annahugh.	
,, fibrosa.	Phil. P. F.	.	*	**	.	Clonea, Annahugh, Killymeal.	5
,, Gothlandica.	Phil. P. F.	.	**	*	.	Bundoran, Malahide, St. John's Pt.	5
,, megastoma[a].	Phil. G. Y.	.	*	*	.	Poulscadden, Lackagh, Scraghy.	
,, polymorpha.	Phil. P. F.	.	*	.	.	Hook, *rare.*	
,, parasitica[a].	Phil. G. Y.	.	.	**	.	Termon, Armagh.	
,, septosus.	Flem., Br. An.	.	*	**	.	Clonea, Armagh, Raheendoran.	
,, serialis.	Port. T. 22. 6.	.	*	.	.	Hook Head.	
,, spongites[a].	Phil. P. F.	.	**	*	.	Lisnapaste, Malahide, Millecent.	10
,, tenuisepta[a].	Phil. G. Y.	.	**	*	.	Finner, Mohill, Howth.	
,, tumida[a].	Phil. G. Y.	.	*	**	.	Kildress, Malahide, Killymeal.	5
Caunopora placenta.	Phil. P. F.	.	.	.	.	Locality lost.	
Cyathophyllum turbinatum.	Gold. T. 16. 8.	.	.	*	.	Benburb.	
,, ceratites.	Port. p. 331.	.	.	*	.	Derryloran, *Clonoe.*	
,, flexuosum.	Gold. Pet. T. 173.	.	.	*	.	Sligo, *Kilvarnet.*	
Stromatopora concentrica.	Phil. P. F.	.	*	**	.	Kilybrone, Howth, Malahide.	
,, polymorpha.	Phil. P. F.	.	.	**	.	Curkeen, Ballyduff.	
,, subtilis.	M'C. xxvii. 9.	.	.	*	.	Curkeen, *common.*	
Ceriopora distans.	M'C. xxvii. 13.	.	.	*	.	Millecent. [courty.	
Verticillopora abnormis.	Lons. S. S.	.	***	.	.	Ballintrillick, Malahide, Ballina-	
,, dubia.	M'C. xxvii. 12.	.	.	*	.	Cookstown.	
Flustra palmata	M'C. xxvi. 14.	.	*	.	.	Finner.	
Berenecea megastoma.	M'C. xxvi. 13.	.	*	.	.	Hook.	
Orbiculites antiquus.	M'C. xxvi. 16.	.	*	.	.	Rahoran.	
Millepora gracilis.	Phil. P. F.	.	***	.	.	Lisnapaste, Ballintrillick, Clonea.	3
,, interporosa.	Phil. G. Y.	.	**	*	.	Lisnapaste, Malahide, FlorenceCourt.	
,, oculata[b].	Phil. G. Y.	.	**	*	.	Ballintrillick. Toberelathan, Howth.	
,, rhombifera.	Phil. G. Y.	.	***	.	.	Lisnapaste, Carrowmably, Poulscad-den.	
,, similis.	Phil. P. F.		**	*	.	Carrowmably, Toberelathan, St.	
,, spicularis.	Phil. G. Y.	.	**	.	.	Bundoran, Poulscadden. [Doulough's.	
Strombodes verrucularis.	Phil. P. F.	.	*	.	.	Benburb, *Portlock.*	
Tragos semicirculare.	M'C. xxvii. 8.	.	.	**	.	Manorhamilton, Cregg.	
Gorgonia assimilis.	Lons. S. S.	.	*	.	.	Ballinacourty.	
,, Lonsdaleiana.	M'C. xxviii. 1.	.	.	**	.	Laracor, Millecent.	
,, ziczac.	M'C. xxviii. 2.	.	*	.	.	Granard.	
Jania antiqua.	M'C. xxvi. 12.	.	*	*	.	Rahan's Bay, St. John's Point.	
,, bacillaria.	M'C. xxvi. 11.	.	*	.	.	Lisnapaste. [agh.	
,, crassa.	M'C. xxvii. 4.	.	*	**	.	Abbey Bay, St. John's Point, Lack-	
Vincularia dichotoma.	M'C. xxvii. 15.	.	.	***	.	Cornacarrow, Knockninny, Millecent.	4
,, megastoma.	M'C. xxvii. 10.	.	.	*	.	Killymeal.	
,, multangularis.	Port. T. 22. 7.	.	.	**	.	Dungannon, Drumglass.	
,, parallela[c].	Phil. G. Y.	.	**	*	.	Carrowmably, Lisnapaste, Killymeal	
,, raricosta.	M'C. xxvii. 11.	.	.	*	.	Killymeal.	
Glauconome bipinnata.	Phil. P. F.	.	**	*	.	Carrowmably, Bundoran, Blacklion.	
,, gracilis.	M'C. xxviii. 5.	.	.	*	.	Killymeal.	
,, grandis.	M'C. xxviii. 3.	.	.	**	.	Killymeal, Meclick.	
,, pluma[d].	Phil. G. Y.	.	*	**	.	Lisnapaste, Belmore, Killymeal.	8
,, pulcherrima.	M'C. xxviii. 4.	.	.	*	.	Blacklion.	
Ptylopora flustriformis[e].	Phil. P. F.	.	.	*	.	Locality lost.	
,, pluma.	Sco. MSS. xxviii. 6.	.	**	*	.	Carrowmably, Malahide, Killymeal.	
Fenestella antiqua.	Phil. P. F.	.	**	.	*	Lisnapaste, Currens, Carrownanalt.	18
,, carinata.	M'C. xxviii. 12.	.	**	*	.	Benburb, Malahide, Tornaroan.	
,, crassa.	M'C. xxix. 1.	.	.	***	.	Blacklion, Millecent, Ballinacourty.	
,, ejuncida.	M'C. xxviii. 11.	.	.	*	.	Blacklion, *abundant.* [Island.	
,, flabellata[f].	Phil. G. Y.	.	**	*	.	Bruckless, Carrowmably, Little	
,, formosa.	M'C. xxix. 2.	.	**	*	.	Currens, Hook, *common*, Killymeal.	

[a] Favosites, was Calamopora.
[b] Millepora oculata, was Pustulopora oculata.
[c] Vincularia parallela, was Flustra parallela.
[d] Glauconome pluma, was Retepora pluma.
[e] Ptylopora flustriformis, was Retepora flustriformis.
[f] Fenestella, was Retepora.

Name.	Authority.	O. R. S.	Cal. St.	Limest.	Coal.	Localities.	Other localities.
ZOOPHYTA—*continued.*							
Fenestella frutex.	M'C. xxviii. 10.	.	.	*	?	Killymeal.	
,, hemispherica.	M'C. xxix. 4.	.	.	**	.	Millecent, Little Island.	
,, intertexta	Port. T. 22. 3.	.	*	.	.	Benburb.	
,, laxa.	Phil. P. F.	.	*	**	.	Clonea, Belmore, Blacklion.	
,, membranacea[a].	Phil. G. Y.	.	*	**	.	Bruckless, Cookstown. Millecent.	4
,, Morissii.	M'C. xxviii. 14.	.	*	**	.	Carrowmably, Millecent, Little Island.	
,, multiporata.	M'C. xxviii. 9.	.	**	*	.	Carrowmably, Poulscadden, Millecent.	6
,, nodulosa[a].	Phil. G. Y.	.	**	*	.	Carrowmably, Rahoran, Blacklion.	5
,, oculata.	M'C. xxviii. 15.	.	**	.	.	Carrowmably, Ballinacourty.	
,, plebeia.	M'C. xxix. 3.	.	**	*	.	Malahide, Hook, Little Island.	7
,, polyporata[a].	Phil. G. Y.	.	**	*	.	Lisnapaste, Carrowmably, Florence Court.	
,, quadradecimalis.	M'C. xxviii. 13.	.	*	*		Carrowmably, Blacklion.	
,, tenuifilla[a].	Phil. G. Y.	.	*	**	.	Lisnapaste, Millecent, Little Island.	
,, undulata[a].	Phil. G. Y.	.	*	*	*	Malahide, St. Doulough's, Carrownalt.	8
,, varicosa.	M'C. xxviii. 8.	.	.	*	.	Blacklion.	
Hemitrypa Hibernica.	Sco. MSS. xxix. 7.	.	*	**	.	Ballintrillick, Clare, Little Island.	
,, oculata.	Phil. P. F.	.	.	*	.	Blacklion.	
Ichthyorachis Newenhami.	M'C. xxix. 8.	.	.	*	.	Meelick.	
Polypora dendroides.	M'C. xxix. 9.	.	**	*	.	Killeshandra, Poulscadden, Hook.	
,, marginata.	M'C. xxix. 5.	.	.	**	.	Killymeal, Blacklion.	
,, papillata.	M'C. xxix. 10.	.	.	***	.	Killymeal, Blacklion, Rathgillen.	
,, verrucosa.	M'C. xxix. 6.	.	.	*	.	Blacklion.	
Retepora flustriformis.	Phil. G. Y.	.	.	*	.	Florence Court.	
,, irregularis.	Port. T. 22. 2.	.	*	*	.	Florence Court, Hook Head.	
,, prisca.	Gold. T. 36. 19.	.	.	**	.	Ballinacourty, *in limestone*, Hook Head.	
,, undata.	M'C. xxix. 11.	.	*	**	.	Lisnapaste, Millecent, Ballyduff.	

[a] Fenestella, was Retepora.

In the foregoing Table, at page 11, there are five species of Dolabra enumerated, which were got at Cultra, in the soft yellow magnesian limestone. This limestone was formerly quarried here and carried to England for manufacturing purposes, and it was out of a few blocks of it that remain on the shore the imperfect casts were got which Mr. M'Coy described, and which I believe he was told were carboniferous. Those casts do resemble the Cuculleæ of the "Palæozoic fossils," but I think they are Permian, or belonging to the Magnesian limestone. They are *Dolabra angusta*, *D. complanata*, *D. Hardingii*, *D. trapezium*, and *D. unilateralis.*

ALPHABETICAL LIST OF LOCALITIES.

Abbeylands, in the county of Donegal, is about one mile N.W. of the town of Ballyshannon, on the north bank of the river Erne. The rock here is calcareous slate, and the fossils are found in abundance and variety along the shore. The black shale is interstratified with thin beds of gray limestone; some beautiful specimens of *Orthis filiaria* are found, and a few of the limestone beds contain a variety of *Orthis crenistria* (*umbraculum?*) four inches in diameter.

Aghaboy, in the county of Cavan, is situated about a mile and a quarter S.W. of Swanlinbar village. The upper part of the limestone occurs here, and there is a cave, called Pulgulm, or the Pigeon-hole, from which a subterranean mountain stream emerges, about which there are some fossils. In this cave the surface of the limestone has a high degree of polish, probably from the friction of particles contained in the muddy waters which flow through it in floods, and which flow down from the sandstone and argillaceous strata of the coal rocks.

Aghafin, in the Queen's County, is one mile S.W. of the village of Castletown, and four miles S.W. of Mountrath; a black calcareous slate occurs here, which is full of fossils.

Aghamore, in Leitrim, lies five miles S.W. of Ballyshannon, and about two miles S.W. of Bundoran. In a stream, at the western boundary of this townland, about fifteen chains south of the road, and at the base of the steep part of the mountain side, a fine black shale occurs, in the calcareous slate in which many species of shale fossils are found, such as Sanguinolites, Amphidesma, Lucina, Nucula, &c., and some of the beds have great numbers of Cythere.

Aghintain, in Tyrone, is two miles west of Clogher. The fossiliferous rock is black shale, which is found in the river which flows through the townland, and in some quarries.

Aghnaglogh, in Tyrone, two miles N.W. of Clogher. A river runs through this townland, in which occurs a black shale in connexion with the sandstone. Some black, hard, calcareous beds are found in this, about two feet above the level of the water, at a

bend in the river, in which the dithyrocarus is found, of two or more species. Farther eastward, under a high bank in the river, a black shale occurs, in which *Modiola Macadami* is abundant, as well as other small shells of the shales. The rock here lies nearly level, dipping at an angle of 3° to 5° eastward down the river, so that the same bed can be often followed for several yards in the banks of the river.

Alteen Stream, in Cavan, lies one mile N.W. of Swanlinbar; both limestone and slate occur in this townland.

Altmush, in Meath, is situated two miles north of the village of Nobber. The rock here is black shale in the vicinity of light gray limestone; it contains *Posidoniæ*, and other fossils of the fine black shale of the millstone grit.

Annagh, in Cork, is four miles S.W. of the town of Charleville, on the limestone, which is fossiliferous.

Annaghilla, in Tyrone, is situated three miles S.W. of Ballygawley. The rock here is arenaceous limestone. It occurs at the road side, under about four or five feet deep of bog. The rock is excavated for lime, and for building. Also, farther N.W., some of the beds appear to be composed of a mass of shells. *Orthis crenistria* and *Orthis Kellii* are the principal, and those two fossils are easily distinguished here from each other.

Annahugh, in Armagh, lies about six miles N.E. of Armagh, and two miles east of the village of Loughgall. The rock is limestone, and dips generally N.W. about 20°.

Araglin Bridge, in Cork, is situated two miles N.E. of Fermoy. The rock is yellowish sandstone, in which black shale occurs, which contains *Cypricardia* and a few other fossils.

Ardagh, in Meath, lies five miles south of Carrickmacross, and two miles N.W. of Drumcondra. This is a high hill of light gray limestone, beds massive, and in some places very rich in fossils. A quarry has been excavated on the road-side, at the eastern base of the hill, in which the fossilist will gain a good return for his labour. *Atrypa excavata* is abundant, though scarce, in other places. The bare rock projects in cliffs on the eastern brow of the hill, and in this, as well as in the loose stones and the fence walls, numerous species are found. This is the only locality in which *Producta striata* has been got.

Ardatrave, in Fermanagh, is two miles S.W. of Kesh village, on

the east shore of Lough Erne. Calcareous slates interstratified with limestone beds occur here, in those rocks which lie below the main limestone.

Ardclough, in Kildare, is about eight miles from Dublin. The quarries are on the southern bank of the Grand Canal. The rock is limestone, of a dark gray colour, beds massive and very pure. Large quantities of it are brought to Dublin, and burned into lime. It is rich in fossils, among which prevail beautiful specimens of *Euomphalus pentangulatus* and *Orthoceras ovale;* also several varieties of corals, the *Fenestellæ* predominating.

Ardloughill, in Donegal, is two miles S.E. of Ballyshannon, and one mile N.W. of the village of Belleek on the river Erne. The fossils here are found in a few small excavations made in the lands, to get stones for fence walls. The rock is calcareous slate, interstratified with beds of limestone near its base. *Pleurorhyncus giganteus* is found abundant.

Ardoginna or Ardoe, in Waterford, lies on the coast, five miles east of Youghal, and one mile south of the village of Ardmore. There is a fine exhibition here of the strata, passing from sandstone into black calcareous slates, alternating with thin beds of limestone dipping at a steep angle towards the sea. Fossils are found in the thin beds of limestone.

Armagh, in Armagh County. This town lies on the junction of the Graywacké and Carboniferous formations, and red sandstone beds, with reddish limestone alternating, form the lowest part visible of the latter. Some beds of the limestone exhibit a remarkable conglomeritic character, and contain numerous angular fragments of red sandstone, and also of red limestone. The limestone in the quarries about the town, at Farmacaffly or Red Barn, and other places, contain many species of the usual fossil shells of the limestone, and also some corals, though the latter are rare. There is a remarkable similarity between the rocks at Armagh, and those at Castle Espie, on the N.W. shore of Strangford Lough, and the prevailing fossils also are common to the two places. *Orthoceras giganteum* and *Productus giganteus* are some of these.

At Armagh the remains of fishes are found in the limestone. Palates, teeth, spines, and rays, are common. The quarrymen have been taught by Captain Jones to appreciate and preserve

them, and a geologist may come upon a pretty good collection of fish remains for a few shillings.

Athenry, ten miles east of Galway, is a small town in the middle of a country of gray limestone, which generally contains very few fossils; the most remarkable is *Lithostrotion striatum*, which is found in very fine specimens in various parts of the surrounding country, especially at Carrowntobber, two miles north of the town, where the rock is near the surface,—as it is in all this locality.

Augharainy, in Fermanagh, lies about one mile south of the village of Kesh, on the road to Enniskillen. The whole country for a few miles round Kesh is composed of yellow sandstone, interstratified with black calcareous slate and limestone bands, which abound in the ordinary fossils. A search here would well repay the labour.

Ballina, a large town, on the river Moy, in Mayo, stands on limestone, in which some fossils are got in quarries about the town.

Ballinacourty, in Waterford, lies three miles east of Dungarvan, on the north shore of the entrance to Dungarvan Harbour. The rock is calcareous slate, dipping to the north, and succeeded by limestone, which is of a very light gray colour, and very pure in quality, apparently one enormous massive bed, having strong and distinct traces of cleavage, but very faint of stratification. The rocks round the shore, southward from the little pier, contain a great variety and abundance of fossils; Productæ, Spiriferæ, Orthides, Atrypæ, and Pecten are found; and in the decomposing rock numerous casts of encrenite heads. Immediately south of the little quay, on the shore, *Pleurorhyncus alœformis* is abundant. This fossil is also found in similar strata at Poulscadden, and opposite the new hotel on the shore at Malahide. The beds of slate have a strong cleavage here, and in getting out fossils care must be taken to break or split the rocks along the sedimentary lines, and not on the cleavage lines.

Ballinafad, in Sligo, lies five miles north of Boyle, on the Sligo road. The limestone at the quarries here dip at a steep angle N.W., on the northern flank of the Curlew mountains. It is not rich in fossils.

Ballinglen, in Mayo, is six miles N.W. of Killala, and two S.W. of the village of Ballycastle. There is a good section of the

rocks on the east side of the glen, having a strong red sandstone at the base, a yellow flaggy sandstone near the top of the hill, and limestone and shales in the intermediate space, with the outcrop of the beds in the face of the hill. Productæ of several species are found in the limestone, and Nuculæ and Cypricardiæ in the black shales; corals are scarce.

Ballinfoile, in Galway, one mile N.E. of the town. Fossils are scarce here. *Producta hemispherica* and *Producta comoides* are found in some of the beds of gray limestone.

Ballinhassig, or Goggan's Hill, in Cork, is seven miles S.W. of Cork City. The new road, leading to the railroad station from Ballinhassig, exposes grey arenaceous and slaty beds, which are full of obscure casts of fossils, especially encrinite stems. *Leptæna depressa* was got there.

Ballintree, in Dublin, is on the shore, one mile north of the village of Rush. The rock is millstone grit. A very good locality for the fossils of the black slates of this division, especially on the shore near the southern boundary of the townland.

Ballybodonnel, in Donegal, is ten miles west of the town of Donegal, and half a mile south of the village of Dunkineely. The rock here is composed of alternations of sandstone, limestone, and black calcareous slate, and is pretty rich in fossils.

Ballycastle.—*See* Tornaroan.

Ballyconnel, in Cavan, a village four miles west of Belturbet, is situated on limestone, which dips there 3° westward. The quarries are a quarter of a mile west of the town. Fossils occur, but not plentifully.

Ballyduff, in Waterford, is two miles west of Dungarvan. The gray limestone there is rich in fossils, and they come well out of the rock.

Ballygasey, in Armagh, is four miles north of the town of Armagh, and one mile east of the village of Loughgall. The limestone here dips northwards at an angle of about 20°.

Ballyhanry, in Galway, is five miles west of Portumna. A light gray limestone occurs here, containing good specimens of *Temnocheilus* and other univalves.

Ballyhoe, in Meath, is five miles south of Carrickmacross, on the Dublin road. The rock is limestone.

Ballykea, in Dublin, is seven miles north of Malahide, and two

miles south of Skerries. The quarries here are of light gray pure limestone, and there is abundance of fossils, which come well out of the rock; two or three species of Euomphalus are common. Millstone grit shales also occur in this townland, which are seen in a deep cutting of the Drogheda Railway, and contain Posidoniæ, and other fossils peculiar to this rock.

Ballymacan is in Tyrone. It is two miles S.W. of Clogher. The streams hereabouts abound with fossils, in a black calcareous slate,—scales of fishes have been found in it, as well as many of the usual fossils of the limestone.

Ballymacelligot, in Kerry, is three miles east of Tralee, at both sides of the Killarney road. Gray limestone occurs here, and a peculiar kind of flinty slate is used in repairing the roads; some fossils are found.

Ballymahon, in the county of Longford, is a pretty large town. The country about here is fossiliferous limestone.

Ballymakean, in Cork, is three miles south of Kinsale. This vicinity affords goniatites.

Ballymeeny, in Sligo, is two miles S.E. of the village of Easky. The rock is rather an impure limestone, mostly in thin beds, which frequently have thin partings of shale.

Ballynure, in Londonderry, is four miles west of Maghera. The rock here is mostly a black calcareous shale, with some hard beds. Fish scales and bones are got in a stream in the east boundary of this townland, about ten chains up from the Moyola river, and twenty chains N.W. of the Forge Bridge.

Balsitric, in Meath, is three miles east of Nobber, and two miles S.W. of Drumcondra. The lower black beds of the limestone occur here with slate; and *Pleurorhyncus giganteus* is abundant in them.

Banada, in Londonderry, is four miles north of Draperstown, on the road to Dungiven. Fossils are got here in red marly shale, of the Old Red Sandstone, in a ravine a few chains east of the road.

Bannaghagole, in Carlow, is two miles west of Leighlinbridge. The rock here is limestone, covered by the coal rocks of Castlecomer. Fossils are found abundant, and some of them, where the rock is exposed to the weather, stand out in relief, and afford fine specimens, showing the muscular impressions of the fossils and other parts very well.

Bannaghbeg, in Fermanagh, is one mile N.W. of the village of Kesh. The Bannagh river, flowing along this townland, affords a good section through the black shales. Fish scales are found in some of the beds, especially these of *Holoptychius Portlockii.*

Banagher, in the King's County, is a middling town, near the Shannon, on limestone. There are some fossils in the quarries near the town.

Banteer, in Cork, is three miles south of Kanturk. The limestone here is light gray; some beds of it appear to be almost composed of a small fossil—*Cucullea arguta;* the same is abundant at Mallow.

Belmore Mountain, in Fermanagh, is six miles S.W. of Enniskillen. The calcareous slate on the eastern face of this mountain contains fossils abundantly, as also the limestone which surmounts it.

Benburb, in Tyrone, is a small town, six miles N.W. of Armagh. Some precipices of limestone are exposed at the old castle, in which fossils are found. In the canal cutting on the south side of the river here, there are five bands of yellow sandstone, alternating with gray limestone and black shale. The limestone and the shale beds contain several species of Productæ.

Blackball Head is in Cork; it is thirty miles from Bantry, on the north shore of Bantry Bay. The black slaty limestone here contains many species of fossils.

Blacklion is in Leitrim, twelve miles W. of Enniskillen, on the Sligo road. The limestone in the vicinity of this place is rich in fossils.

Blackrock, in Cork, is two miles E. of the city, on the south side of the river. There are several quarries of gray limestone in the vicinity, which abound with fossils. All the fossils of the valley of Cork are distorted, both those which lie in the calcareous slaty strata of the base of the limestone, and those in the limestone itself. The limestone of this valley appears to have undergone a kind of cleavage, and the calcareous slate which lies belows it has a very distinct cleavage. This is not usual in the midland or northern counties of Ireland. The line which separates those conditions of the calcareous rocks and their fossils may be said to be the course of the river Blackwater from Cappoquin to Mallow, producing this line a few miles both ways. It is remarkable on the two sides of Waterford Harbour, that the fos-

sils of the calcareous slates on the west side of it, about Clonea and Dungarvan, are highly distorted; while those on the east side, about Hook Head, on the same parallel, and in similar rock, are not so, or are at least but very slightly altered.

Boa Island, in Fermanagh, is an island in the north end of Lough Erne. The rocks here are mostly yellow sandstone, black shale, and impure limestone, all of which contain fossils. Those of the sandstone are only casts, the calcareous portion of the fossil having been absorbed or removed.

Bohevny, in Fermanagh, lies on the west side of Lough Erne; it is situated one mile N.W. of the village of Churchhill. The rock is mostly black slate with thin beds of limestone, being the lower part of the limestone.

Boston, in Kildare, is six miles north of Kildare, and four miles east of Rathangan; fossils are plentiful in the limestone here.

Brackaghreilly, in Londonderry, is two miles west of Maghera, and on the road to Draperstown. The east boundary of the townland here is a stream, and in this, a few perches north of the road, a bed of gray rock, about a foot thick, occurs in black shales at the level of the water, in which scales and bones of fish are plentiful.

Brickeen Bridge, in Kerry, is four miles south of Killarney. The calcareous slates about this place yield fossils.

Bruckless, in Donegal, is eleven miles west of the town of Donegal, and one mile north of the village of Dunkineely. The rock here is composed of red sandstone, which forms the base of the Carboniferous rocks, succeeded by alternations of yellow sandstone, black slate, and thin beds of limestone. The finer beds of the slate contain a profusion of the fossils usually found in those beds, the best of which are found in a stream which flows westward through the townland, into the sea.

Bunaninver, in the county of Fermanagh, is three miles south of the village of Kesh, on the east shore of Lough Erne. Where the shales and thin beds of limestone are exposed to the action of the water, the fossils are easily seen.

Bunatrahir, in the county of Mayo, is eight miles N.W. of Killala, and about a mile N.W. of Ballycastle. The rocks along the western shore of Bunatrahir Bay are well exposed, being the lowest part of the limestone subdivision of the Carboniferous

series, and afford fossils in the limestones, the shales, and even here in red sandstone—a thing unusual.

Bundoran, in Donegal, is a bathing village, three miles S.W. of Ballyshannon; the rock here is calcareous slate, with beds of impure limestone, the strata lie nearly level, and are very well exposed. The black shales and impure limestone beds contain a profusion of fossils. In one place in the bay some beds of the rock are covered with *Orthis resupinata*, studded so closely that they resemble a pavement of stones about two inches diameter. In the west side of the bay, near low-water mark, in black fine slates, some beautifully marked Pectens are got; and near the same place, where there are rude steps made in the precipice as a passage to descend to the water, one of the upper beds of the cliff, about three feet thick, is composed almost wholly of a mass of *Orthis crenistria*.

Bunowna, in Sligo, is at the east side of the river at Easky, about fifteen miles N.E. of Ballina. The rock is a dark, impure limestone, and is well exposed in the river near the village, and on the shore. *Siphonophyllia cylindrica* is very abundant, and the specimens very large. Large bunches of *Lithodendrons* occur on the shore.

Burris, in the Queen's County, is two miles N.E. of Maryborough. The rock is light gray limestone, which abounds with the fossils usually found in this rock.

Caheratrim, in Galway, is three miles S.W. from Loughrea, on the north brow of the Derrybrian mountains. Slate occurs here at the foot of the hill, in a stream that runs northward, a few chains south of its junction with a larger stream running westwards. This slate is calcareous, and contains a profusion of the ordinary fossils found lowest in the series, as *Leptagonia analoga*, *Spirifer attenuata*, *Orthis crenistria*, &c. &c.

Calragh, in Armagh, is five miles N.W. of the town of Armagh. The rock is limestone, and dips N.W. about 10°. Indeed, the general dip of the rock for a few miles northward of Armagh is to the N.W. Productæ and Spirifera are found here.

Cappaghmoyle, in Galway, lies four miles N.E. of Athenry. A light gray limestone occurs here, full of beautiful fossils, a thing unusual for miles in the limestone of the surrounding country. The rock has not been quarried, except a little used for fences; but the beds are bare at the only farmhouse on the townland,

close to the bog edge, and appears to underlie an extensive bog, situated to the east. The whole country westward is calcareous slate, and the nearest dip to this is eastward, towards and under the limestone, which is a mile off.

Carlingford, in the county of Louth, is a pretty large town on the south side of Carlingford Bay. Limestone is extensively quarried near the town, and contains fine specimens of fossils; *Siphonophyllia cylindrica*, *Bellerophon apertus*, *&c.*, are common. The limestone here is near the junction with the greenstone of Carlingford mountain, and is penetrated with numerous trap dykes, some cutting across others, and showing dykes of three separate epochs. Near the junction, the limestone is in some places highly crystalline, white in colour, and contains large, rudely formed garnets.

Carn, in Fermanagh, is three miles S.E. of Kesh, on the east side of Lough Erne. The rock here is all limestone, and contains fossils.

Carrickboy, in Longford, is five miles N.E. of Ballymahon, and about five miles S.W. of Edgworthstown. The limestone here is light gray, and very fossiliferous.

Carrickduff, in Longford, is two miles north of Granard.

Carrickoughter, in Fermanagh, is two miles N.W. of Kesh; it is situated in the limestones, shales, and sandstones of this neighbourhood, which lie low in the formation.

Carrigahorig, in Tipperary, is three miles S.E. of Portumna. A deep cutting for a mill-race has been made here through the rock, which leaves it well exposed. The colour is light gray, and it is very fossiliferous. *Univalves*, such as *Nautilus*, *Euomphalus*, &c., are common, and they come well out of the rock.

Carrigaline, in the county of Cork, is six miles S.E. of Cork; light gray limestone similar to that of the Cork valley occurs here, and contains fossils.

Carrowmably, in Sligo, is four miles S.E. of Easky on the seashore.

Carrowmacrory, in Sligo, is six miles east of Easky, on the seashore. The rock here is impure limestone, and fossiliferous.

Carrowmore, in Sligo, is four miles S.W. of Coolaney, and five miles N.E. of Tobercorry, on the west side of Knocknashee Hill. The rock is limestone, and fossiliferous.

Carrownanalt, in Roscommon, is two miles N.E. of the village of Keadue, and one mile west of Lough Allen. It is in the coal measures of that district, and about 200 feet above a bed of coal that has been worked near it. Thirty-five species of shells and trilobites were obtained in a few blackish beds, altogether about three feet thick, which are a little calcareous. Of the thirty-five species, twenty-six are found also in the gray limestone, and are, therefore, common to both, and nine species peculiar to the coal rocks. Four specimens and four fragments were got also at this place, which Mr. M'Coy thought to be new, or undescribed.

Carrowntreemall, in Fermanagh, lies ten miles S.W. of Enniskillen, on the Sligo road, and on the north shore of Lough Macnean. This is a good locality for fossils of the limestone.

Carrowntobber, in Galway, is two miles N.E. of Athenry. *Lithostrotion striatum*, which is very fine here, is the chief fossil found. Fossils are scarce in the limestone about this place.

Cartronaglogh, in Roscommon, is half a mile north of the village of Keadue, in the upper part of the limestone, and gives a pretty good variety of fossils.

Cashelboy, in Sligo, is twelve miles west of Sligo, on the Ballina road, and about half way between Skreen and Dromore west. A stream, which forms the western boundary of the townland, crosses the road near a chapel, and in this stream, four chains south of the road, is a sandstone quarry, in which there is some shale, which contains *Cypricardia rhombea* abundantly.

Castlecreagh, in Cork, is one mile east of Doneraile, where fossils are got in the limestone.

Castle Espie, in Down, is on the western shore of Lough Strangford, eleven miles S.E. from Belfast, and two miles S.E. of Comber. This limestone has a mass of beds of red sandstone over it. It is of a reddish colour, very pure. Many of the fossils of the carboniferous limestone are found here, especially very fine specimens of the *Actinoceras giganteum*, three feet long, and nine inches diameter at the thick end.

Castle Island, in Kerry, is a small town; it stands on the upper part of the limestone, which hereabouts contains in some beds a variety of fossils.

Castlerickard, in Cork, is two miles N.E. of Castlemartyr, and situated in the lower part of the limestone district of that country.

CASTLETOWN, in Meath, is four miles south of Trim. The light gray limestone here abounds in fossils.

CAVANSALLAGH, in Tyrone, is two miles N.W. of Drumquin. The limestone here has several varieties of fossils. Specimens of *Siphonophyllia cylindrica* are found, exactly like those got at Carlingford.

CHICKEN HILL.—*See* KILLMALLOCK.

CLARAGHMORE, in Tyrone, is one mile and a half N.E. of Drumquin. Casts of *Bellerophon apertus* and *Cornu arietis* occur here in beds of arenaceous limestone, which is impure and very siliceous.

CLARE, in Tyrone, is half a mile east of Cookstown. Very beautiful specimens of *Lithostrotion striatum* are found here.

CLAREVIEW, in Fermanagh, is two miles S.W. of Kesh, on the east shore of Lough Erne.

CLEEN, in Roscommon, is four miles N.E. of Boyle, and one mile from Knockvicar bridge. Arenaceous limestone occurs here, which has many of the fossils of the lower beds of the Carboniferous limestone.

CLEENISHGARVE, in Fermanagh, is an island in Lough Erne, about two miles S.W. of Kesh. The rock consists of the alternating slates and limestones of the lower part of the Carboniferous limestone.

CLIFDEN, in Clare, is one and a half miles west of Corofin, is a millstone grit locality. In the road side, in a wood, the black slaty strata are exposed, and yield *pectens*, *posidoniæ*, &c.

CLONEA, in Waterford, is three miles N.E. of Dungarvan, on the seashore. The calcareous slate, interstratified with beds of limestone, occurs here, as at Ballinacourty, and contains an abundance of fossils. The rock here, which dips 20° south, is probably the counterpart of that at Ballinacourty, which dips the reverse way, or northward, both being the lower slates and limestone beds of the valley of Dungarvan, over which rests the pure light gray limestone of Ballinacourty, Ballyduff, and the whole valley of the Blackwater, to Lismore and Fermoy. That which is shale in other localities, as at Hook Head, is here slate, from the distinct cleavage which it exhibits in this valley. All the lower and impure shales of the south of Ireland, beyond a certain line, show a cleavage, which is not seen to the north of that line, which cleavage appears to be connected with the distortion of the fossils imbedded in it. The line above alluded to extends from this

place westward to Cappoquin, Fermoy, Mallow, Kanturk, Killarney, and thence to Castlemaine Bay, keeping its position chiefly along the valley of the Blackwater river, for a great part of the way.

Cloonlara or Meelick, in Clare, is three miles N.E. of Limerick. Very fine fossils are got here. The *Ichthyorachis Newenhami*, a new and beautiful coral, was found here by Mr. Newenham, of Dundanion Castle, Blackrock, Cork, who kindly presented it, to have a drawing and description made, as seen in Plate xxix. fig. 8, of Synopsis.

Clonkeiffy, in Cavan, is five miles S.W. of Virgina. The lower shales and limestone here contain *Spirifer minima*, which is abundant here, but very scarce generally.

Clonturk, in Monaghan, is three miles S.E. of Carrickmacross, and is in the limestone of that district, which is fossiliferous.

Cong, in Galway, is a village on the N.E. angle of Lough Corrib. The limestone hereabouts contains but few fossils; the *Lithostrotion striatum* is the most common. The rock in lithological character very much resembles that at Athenry. Though perhaps it may be out of place here, it may be interesting to remark that Silurian fossils are abundant on the north shore of Lough Corrib, at Ardaun, and other places.

Cookstown, in Tyrone, is a small town. The north end of the town is on limestone, of a light gray reddish colour. In the quarry, a quarter of a mile west of the town, the upper part of the rock is in a decomposing condition, and the fossils come beautifully out of it.

Corick, in Londonderry, is three miles south of Draperstown, on the east side of the White river, which affords a good section of the shale and limestone of this district. The black slates are fossiliferous. *Atrypa gregaria* is found here.

Corlave, in Fermanagh, is three miles N.W. of Kesh. The shales and limestones here abound in fossils.

Cornadowagh, in Longford, is seven miles west of Ballymahon. The limestone here affords fossils.

Cornagrade, in Fermanagh, lies on the east side of Enniskillen, half a mile distant. The quarry gives out some specimens Productæ and Spiriferæ. The *Orthis gibbera*, Plate xviii. fig. 9, Synopsis, has been found here, and nowhere else.

Countenan, in Cavan, is four miles east of the town of Cavan, and one mile N.W. of the village of Stradone. A large quarry here, in an arenaceous limestone, affords a good variety of fossils.

Courtlough, in Dublin, is three miles south of Balbriggan. A large quarry has been opened here near the base of the coal formation, which contains some of the shale fossils of that division of the Carboniferous rocks.

Cove, in Cork, now Queenstown, is a seaport town in Cork Harbour. In a black slate, immediately west of the town, *Loxoceras incomitatum* is found. It appears to me very doubtful that this slate belongs to the Carboniferous rocks.

Cregg, in Meath, is two miles north of Nobber. The limestone here has many beautiful varieties of fossils.

Cregganore, in Galway, more commonly known by the name of Toberelathan is on the N.W. brow of the Derrybrian mountains, six miles S.W. of Loughrea, and two furlongs east of the Gort road. There is a junction visible here, in a stream of the Old Red Sandstone, lying unconformably on the graywacke slate, and a little higher on the hill are several junctions, showing patches of yellowish conglomerate on the slate; and in some places, a few perches of the lower bed or two only; near the well called Toberélathan, in the stream, the blackish calcareous slate appears; the lowest slate of the Carboniferous rocks, which is full of the usual fossils, especially *Spirifer attenuata* and *Leptagonia analoga.*

Crevenish, in Fermanagh, is one mile S.W. of Kesh, on the eastern shore of Lough Erne. This is a good fossiliferous district.

Croppatrick, in Mayo, is one mile S.E. of Killalla. The arenaceous limestone here is fossiliferous.

Cruicetown, in Meath, is two miles west of Nobber.

Cuilmore, in Mayo, is three miles east of Claremorris. Calcareous slate, with limestone, here has the usual fossils. Fenestellæ are abundant.

Culleenamore, in Sligo, is five miles west of Sligo, on the western side of Knocknarea mountain. This place is remarkable for the abundance of specimens of *Syphonophyllia cylindrica*, which are found in the fields, as they are disintegrated by the weather from the limestone cliffs of Knocknarea, and roll down the side of the hill. Some of those are three or four inches in diameter, and the pieces a foot long; but the whole fossil, as found at Kilglass, on the sea-shore, is two feet long.

Cullion, in Londonderry, is two and a half miles S.E. of Draperstown, and five miles S.W. of Maghera. In a deep ravine on the N.E. brow of Slievegallion mountain, the lower calcareous black shale contains a great profusion of beautiful fossils, among others *Spirifer pinguis* is very abundant.

Cultra, in Down, is on the south shore of Belfast Lough, five miles N.E. from Belfast, and one mile N.E. from Holywood. The rock here is much broken up by whin dykes. It lies on graywacke slate unconformably. One of those dykes forms the foundation of the little pier at this place, and to the west of this, the black shaly strata are well exposed at low water. About forty yards out from high water-mark, in some of the beds, the scales of fishes (*Holoptychius Portlockii*) are found very fine; and immediately adjoining the pier in the fine black shale are millions of Cytheræ, of several kinds. Similar fish scales and Cytheræ are found in the black shale band which runs across the valley of the Moyola near Maghera; and at the Bannagh river, near Kesh, in Fermanagh. From having fish remains of similar species found here as at Moyheeland, and the rock there having been supposed to be a band of black shale in the Old Red Sandstone, this was put in the same rock, it being impossible to fix its place here by visible superposition. It is very doubtful that it belongs to the Old Red. The rocks on the shore are much broken up with whin dykes, and between every two of them a rock of different aspect is brought to the surface. There are red sandstone, red shale, red thin-bedded limestone, yellow magnesian limestone, and black and gray shale, all in the space of about half a mile, between high and low water mark. Those rocks in Yorkshire and Durham would be recognised as being in the vicinity of the upper part of the Coal formation, and of them, this bit of shore is very probably the equivalent. This would make this black shale belong to the coal strata, and the fish remains here, at Moyheeland, and the River Banagh, near Kesh, would be all common to that series; indeed, beside the fish remains, those black shales and accompanying rocks in the three places just mentioned are identical in lithological character.

Curkeen, in Dublin, is seven miles north of Malahide, and two miles south of Skerries. The quarries here, in light gray pure limestone, contain a variety of beautiful fossils.

Curragh, in Waterford, is one mile north of the village of Ardmore.

The road here is cut through, and shows some sections of shale, which afford specimens of the fossils usually found in those lower beds.

CURRAGHMORE, in Fermanagh, is four miles west of Kesh, on the north shore of Lough Erne.

CURRENS, in Kerry, is six miles S.E. of Tralee, on the Killarney road, and about three miles S.W. of Castle Island. This is a very fine locality for the fossils of the calcareous slate, and they are got in a state of good preservation.

CUSACKSTOWN, in Meath, is six miles S.E. of Navan, and is in the lower part of the limestone. The rocks here contain the usual fossils.

DEERPARK, in Fermanagh, is two miles S.E. of Kesh; it is a locality of the lower part of the limestone.

DERRYGONELLY is in Fermanagh, is eleven miles N.W. from Enniskillen, on the west side of Lough Erne. Casts of fossils are found here in a quarry, in a soft yellow sandstone.

DERRYLORAN, in Tyrone, is at the south end of the town of Cookstown. Alternate beds of limestown and sandstone occur here. The sandstone is generally red; but a thick bed, near the church, is of a greenish-gray colour. The limestone, like all hereabouts, is fossiliferous, some of it takes a high polish.

DERRYNACAPPLE, or DERRYNACAPPLEKEAGH, in Fermanagh, is four miles N.E. of Kesh. This is a locality of limestone, shale and sandstone alternating, with the usual fossils.

DESERTMARTIN, in Londonderry, is a small town, four miles south of Maghera. The limestone quarries here are not very fossiliferous. Fish palates have been got in them.

DONAGHRISK, in Tyrone, is two miles S.E. of Cookstown, and immediately west of the village of Tullyhog. Like Derryloran, limestone and sandstone are found here alternating. Some fossils are got in the limestone.

DONERAILE is in the county of Cork. The limestone in this locality is fossiliferous.

DOONFEENY, in Mayo, is eight miles N.W. from Killalla, and two N.W. of Ballycastle. This is a locality of the arenaceous rocks. Black shales predominate; but there are also thin beds of impure limestone. Some beds of the shale are very fossiliferous.

DOORIN, in Donegal, is seven miles west of the town of Donegal, and

lies on the north side of Donegal Bay. The cliffs along the sea-coast here are very finely exposed—they are all black shale. This is a good locality for fossils. *Pleurotomaria canaliculata* is found here, and is a very scarce fossil elsewhere.

Downs, in Armagh, is a quarter of a mile S.W. of the town of Armagh. The limestone of this locality is of reddish-gray colour, and contains palates, teeth, and spines of fishes.

Dromard, in Londonderry, is two miles east of Draperstown, and about five miles S.W. of Maghera. A stream which flows northward from Slievegallion along the east boundary of this townland gives a good section of the rocks. The usual Modiola and Nucula of the lower black shale are found here, and *Murchisonia elongata* is plentiful.

Drumbrick, in Fermanagh, is four miles N.E. of Kesh, and one and a half north of Ederny.

Drumcurren, in Fermanagh, is two miles N.E. of Kesh.

Drumdoe, in Roscommon, is four miles north of Boyle, on the S.E. shore of Lough Arrow. The lower part of the limestone here is fossiliferous, and has a good variety.

Drumgowna, in Fermanagh, is three miles N.W. of Kesh, in the calcareous slaty division.

Drumkeeran, in Fermanagh, is two miles N.E. of Kesh. These localities about Kesh are all in the shales, limestone, and sandstones, which alternate in this part of the country, and lie on the red base of the Old Red Sandstone.

Drumlattery, in the county of Dublin, is on the sea-shore, two miles south of Skerries. The rock here is limestone, and fossiliferous.

Drummanmore, in Armagh, is one mile N.E. of the town of Armagh. The limestone here contains a good variety of fossils.

Drumnagroagh, in Donegal, is one mile S.E. of Ballyshannon. The limestone here is at the surface, and fossiliferous.

Drumod, in the county of Leitrim, is a village about twelve miles north of Longford, on the mail-coach road. A few perches north of the town, on the Mohill road-side, calcareous slate is found, containing abundance of fossils; and one mile N.W. of Drumod, on the Shannon shore, is yellow sandstone, and black shale, the latter containing Modiola, and other fossils usually found in that position.

Drumowen, in Tyrone, is two miles west of Drumquin. The same band of limestone, containing the same fossils, crosses this townland, which is found in Drumscraw and Cavansallagh, the adjoining townlands.

Drumreagh Etra, in Tyrone, is four miles N.E. of Dungannon, on the Stewartstown road. The limestone here is supposed to be of the upper part, from its immediate proximity to the Coal Island coal district.

Drumreask, in Fermanagh, on the west shore of Lough Erne, is one mile north of the village of Church-hill. It is a good locality for black shale fossils.

Drumscraw, in Tyrone, is one mile S.W. of Drumquin. The band of gray limestone which crosses this townland contains a great variety of the usual fossils of the limestone.

Dundonagh, in Monaghan, is six miles north of Monaghan, and two miles S.E. of Emyvale.

Dunkineely, in Donegal, is a small town, ten miles west of Donegal. This is a sandstone locality, and has the usual alternations of sandstone, limestone, and shale, found at the base of the Carboniferous limestone in the N.W. parts of Ireland. The rocks mostly dip S.E. about 10°. The locality abounds in fossils.

Dunkit, in Kilkenny, is three miles north of the city of Waterford. Large excavations have been made here in limestone; but the rock is not fertile in fossils. The calcareous slate which underlies it, and is exposed about the entrance to the quarry, yields fossils plentifully, and in a good state.

Edenacrannon, in Tyrone, is four miles S.W. of Dungannon. The rock is the lower part of the limestone, with its interlaminated slate.

Edenasop, in Tyrone, is five miles S.W. of Castlederg.

Ederny, in Fermanagh, is two miles east of Kesh.

Enagh, in Armagh, is seven miles west of Armagh; about a quarter of a mile S.E. of the village of Tynan. Teeth and spines of fishes are found in the light reddish-gray limestone, as at the Downs, near Armagh.

Fallagloon, in Londonderry, is two miles west of Maghera. The mountain stream which forms the east boundary of this townland exposes a good section of the Old Red Sandstone; and the black shales, about a mile up from the chapel, contains a profu-

sion of the usual fossils of that division of these lower beds. *Axinus nuculoides* is got in whole masses; *Modiola Macadami*, and *Modiola subparallela*, abundant; seven species of Cytheræ have been got, and scales of *Holoptychius Portlockii*. A band of gray shale crosses the Moyola from this to the White river; this band is supposed to have the Old Red Sandstone under and over it. See *Moyheeland*.

Farmacaffly, or Redbarn, in Armagh, is one mile S.W. of Armagh, Fish remains are got in the limestone here,—palates, teeth, and spines.

Fasglassagh, in Tyrone, is four miles N.E. of Ballygawley. The lower black shales abound here, and contain the usual fossils.

Fellow's-hall, in Armagh, is seven miles west of Armagh—a limestone locality, and fossiliferous.

Finner, in Donegal, is three miles S.W. of Ballyshannon, on the south side of the mouth of the river Erne. The rocks are so well exposed by the action of the waves that it is an excellent locality for the fossils of this part of the series.

Flemingstown, in Meath, is six miles west of Balbriggan, and one mile N.W. of the village of Naul. About the chapel of Clonalvy the limestone is light gray, and the fossils come out well.

Fort-william, in Cork, is one mile and a half S.W. of Doneraile, on the Mallow road. A good limestone locality for fossils.

Glenbane.—*See* Lackagh.

Granard, in Longford, is a small town, situated on the lower shales and sandstones of the carboniferous rocks. Numerous fossils occur here.

Grangemore, in Roscommon, is three miles S.W. of Boyle, and two north of Frenchpark; an extensive field of limestone spreads over this part of the country, but does not contain a great variety of fossils. *Orthis filiaria* is common.

Greaghs, in Donegal, is three miles S.E. of the town of Donegal, and half a mile east of the village of Laghy. The fossils of the lower black shales are abundant here.

Gubbaroe, in Fermanagh, is two miles S.W. of Kesh, on the east shore of Lough Erne. This is a good locality for fossils.

Gurteenroe, in Cork, is two miles north of Bantry. The rock here is calcareous slate. No good excavation is exposed, but hummocks of slate on the road side afford crinoid stems and fenestellæ.

Holeopen Bay, in the county of Cork, is six miles south of Kinsale. Goniatites, and shells much resembling Posidoniæ, are got here in black slate; the slate and the fossils much altered and distorted, apparently by metamorphic action. The kinds would suggest the idea that the slate is an altered millstone grit.

Hook Head, or Hook Point, in Wexford, is situated on the east side of Waterford Harbour, and the shore here affords a fine section of the lower part of the carboniferous rocks. First, red conglomerates and red sandstone, with some beds of yellow in ascending southwards, and a few beds of red or blue shale; the upper part all yellow or gray, and a little calcareous, and it is in these the fossils first appear. Next comes a series of thin beds of limestone, and black shale alternating. The limestone rises in large flags, of which both sides are covered with a profusion and variety of fossils. This is on the townland of Portersgate. Over it lie yellow sandstone and calcareous gray sandstone, and this again is succeeded by thin beds and afterwards thick beds of limestone alternating with shale, for more than a mile along the shore, but nearly level. Next, towards Hook Point, the whole becomes limestone, with but a few and very thin beds of shale. In the whole peninsula, the rock is so well exposed along the sea-shore that it is one of the finest localities in Ireland for fossils. Very fine specimens of crinoid heads have been found near the Point. They are usually got in the thin beds of shale which separate the limestone beds, where the action of the waves carries away the soft matter of the shale, and leaves them standing in relief on the surface of the bed of limestone. In considering them, on the spot, the idea is suggested that they grew on the surface of a bed of limestone in the sea—as seaweed now does—that a flood came over the place, charged with sand and mud, and killed the animals, which, therefore, lay dead, and were buried in the muddy deposit left by the waters, which is usually from three to six inches thick between the beds of limestone. The heads and stems, for some feet in length, are got together, lying in these thin shale beds, and in some cases have all their fine markings beautifully shown.

Horath, in Meath, is five miles north of Kells. The rock is the dark limestone, which lies near the base of that subdivision. Several fossils are found in it—*Bellerophon apertus* and *Pleurorhyncus giganteus* are common.

Howth, in Dublin, is nine miles east of Dublin. A fine quarry of limestone occurs here, the rock being also well exposed on the shore, a little to the north of the village, and contains the usual fossils.

Inver, in Donegal, is situated on the sea-coast, seven miles west of Donegal. This locality is all in black calcareous slate and shale, of the lower part of the limestone division.

Kesh, in Fermanagh, is thirteen miles N.E. of Enniskillen, near the N.E. angle of Lough Erne. The development of the sandstone, to the north of this place, with its alternations of limestones and shales, is remarkable.

Kilbride, in Mayo, is seven miles N.W. of Ballina, and two miles N.E. of the village of Ballycastle. The rock is limestone, with its shales, and this place shows it well, being surmounted by sandstone. The place is rich in fossils. *Atrypa gregaria* occurs in masses; it has been only found here, at Ballinglen, which may be said to be part of the same series of beds, and in the White river, near Draperstown, in Londonderry.

Kilcar, in Cavan, is two miles S.W. of Belturbet. The rock here is limestone, and fossiliferous.

Kilcommock, in Longford, is three miles N.W. of Ballymahon, a lower limestone locality, and fertile in fossils.

Kilcummin, in Mayo, is on the sea-coast, five miles N.W. of Killala. This is a locality of alternations of limestone, shale, and yellow sandstone, and contains many varieties of the fossils usually found in this position.

Kilcurry, in Louth, is four miles N.W. of Dundalk. In this locality is found red sandstone, some black shales, and some limestone, as also yellow sandstone. The shales especially have fossils.

Kildress, in Tyrone, is two miles west of Cookstown. In the river here is found a section of red shale, which contains the usual fossils of the black and gray calcareous shales, especially trilobites and corals, and this is the only locality where such fossils have been got in red shale. A little higher up, or westwards in the river, is found a red sandstone also, which contains abundance of casts of fossils. *Atrypa canalis* and *Atrypa laticosta* are got in this sandstone.

Kilglass in Sligo, is eight miles north of Ballina, on the sea-shore, on the east side of Killalla Bay. The limestone is well exposed

here, and affords some of the finest specimens of *Siphonophyllia cylindrica*. There are several whin dykes here, running in an east and west direction, cutting through the limestone rock.

KILLAGHTEE, in Donegal, is situated on the sea-shore, eleven miles west of Donegal, and one mile S.W. of the village of Dunkineely. This locality is in the lower shales and limestones, and the sections are well exposed by the action of the water, and contain much fossils.

KILLESHANDRA, in Cavan, is a small town. It stands on yellow sandstone, but over this lies limestone with shale, which is partially quarried, about two furlongs west of the church. This limestone contains a great variety of fossils.

KILLINAMACK, in Waterford, is three miles S.W. of Clonmel, near Knocklofty bridge. Calcareous slate occurs here at the road-side, which contains a profusion of fossils.

KILLINGLY or BALLEA, in Cork, is five miles S.E. of Cork, and two miles N.W. of Carrigaline. The calcareous slate here contains only one group of slaty beds between the yellow or upper part of the sandstone and the overlying limestone.

KILLOGUNRA, in Mayo, is two miles S.W. of Killalla. The lower shales and limestones occur here, and are fossiliferous.

KILLUKIN, in Roscommon, is about one mile S.W. of Carrick-on-Shannon. The rock is limestone, and very fossiliferous.

KILLYBRONE, in Mayo, is one mile N.W. of Killala. The fossiliferous rock here is an oolitic limestone, nearly black, and appears covered by yellow sandstone.

KILLYCLOGHY is in Fermanagh. It is about a mile and a half S.E. of Lisbellaw. A river flows down into the valley southwards, in which yellow sandstone and the accompanying shales and limestones are exposed, in which are found the usual Modiolæ, Nuculæ, &c. of the lower shales.

KILLYGREAN UPPER, in Monaghan, is about two miles N.E. of the little town of Emyvale, a locality of limestone, shale, and sandstone, the two former having fossils.

KILLYMEAL, in Tyrone, is half a mile east of Dungannon. On account of the vicinity to the coal district of Coal Island, the rock here is supposed to be the upper limestone, but there is no visible junction to verify this supposition. The quarries, which are extensive, afford a good variety of fossils, and there are some vertical cracks, which admit water from the surface, and which

are in a decomposing state for two or four inches inwards from the surface of the crack, and in this part of the rock are found the most beautiful fossils, of a purely white colour, with all their most delicate markings, in a high state of preservation. The pores of fenestellæ, and the finest striæ of pectens are seen under the magnifier. *Producta latissima* is abundant here, though scarce in other localities.

Kilmacduagh, in Clare, is five miles S.W. of Gort. Fossils are not plentiful in the limestone here.

Kilmallock, in Limerick, is a limestone locality. There are large quarries in the vicinity, and the usual fossils of the limestone come out in abundance, and show the markings uncommonly well.

Kilmore, in Armagh, is six miles N.E. of the town of Armagh. The dip of the limestone, which is fossiliferous here, is about 15° N.W.

Kiltullagh, in Roscommon, is eight miles S.W. of Castlereagh. The lower part of the limestone is the rock here.

Knockagh, in Louth, is three miles N.W. of Dundalk. The rock is limestone with shale, interstratified near the base of the limestone subdivision of the Carboniferous system.

Knocknarea, in Sligo.—*See* Culleenamore.

Knockninny, in Fermanagh, is a steep high hill, on the west side of Lough Erne, ten miles south-east of Enniskillen. The rock is a light gray limestone, and it contains here some beautiful fossils, especially Fenestellæ, on the west side, half way up the hill.

Knockonny, in Tyrone, is half a mile north of Ballygawly. A yellowish calcareous slate occurs here, in a stream in which a peculiar Pecten is abundant, and no other fossil. It has been called *Pecten Knockonniensis* from this place.

Lackagh, in Tyrone, is one mile west of Drumquin. In the low part of this townland, near the bridge, limestone occurs, which yields beautiful specimens of *Producta hemispherica*.

In the high part, or western end, is a ravine called Glenbane, in which a stream has made a deep cut in the black shale; this is one of the best localities in Ireland for fossils. I believe these black strata to be the millstone grit, or lower part of the coal formation. On the banks of this stream, if the grass and soil be dug away, near the top, the rock is soon laid bare, and this upper decomposing part of it yields the finest casts of fossils, which come

out well. Where a vertical crack occurs in the rock, which has admitted water for years, the rock becomes partially decomposed, for six or twelve inches away from the opening, and this part also yields the fossils clean. The sound shale also contains them, but they cannot be got well out. There is no cleavage in the shale here, as at Ballinacourty, or other parts of the south of Ireland. The mass of the hill is composed of strata, lying nearly level.

LACKEN, in Roscommon, is three miles S.E. of Athleague. The country for many miles about this place is limestone, light gray, and unmixed with shale.

LAGHY, in Donegal, is a village four miles south of Donegal, on the Ballyshannon road. This locality is near the base of the limestone.

LANE, in the county of Dublin, is on the sea-shore, two miles S.E. of Skerries. The limestone rock is well exposed here. An area of some acres of it on the surface between high and low-water mark is dolomite.

LARACOR is in Meath, two miles south of Trim. Light gray limestone occurs here, and contains a good variety of fossils.

LARAGH, in Cavan, is six miles east of Cavan, and one mile north of Stradone. In this place is a basin of the lower part of the Carboniferous rocks, comprising sandstone, shales, and limestone, resting on the graywacke slate of the surrounding country. Fossils are found here.

LARGANMORE, in Mayo, is fourteen miles west of Crossmolina, and four miles west of Corick bridge. Immediately north of the Belmullet road rises a series of beds of black shale, with a few beds of impure blackish limestone. A great variety of the black shale fossils, as Modiolæ, Nuculæ, Cypricardiæ, Cytheræ, &c., are found here. These shales are over the Old Red Sandstone.

LEAM is in Fermanagh, two miles east of the village of Tempo, and three miles west of Fivemiletown. The Manyburns river flows here through the lower shales, and affords sections which yield the usual fossils. *Cypricardia socialis* is found in great abundance.

LECK is in Monaghan, two miles north of Glasslough, is on limestone which contains fossils.

LISARDREA is in Roscommon, two miles S.W. of Boyle. This is a limestone locality, but not very fossiliferous.

Lismore, in Tyrone, is half a mile S.W. of Clogher. All the strata here are fossiliferous, up to the sandstone which lies south of Clogher.

Lisnapaste is in Donegal, five miles south of the town of Donegal, and one mile and a half S.E. of the village of Laghy. About three furlongs south of the village of Ballinakillew is a little bridge, and the bed of the stream that flows through it is on black shale, which affords fossils of great variety, and of great beauty. A few chains south of this bridge, on the road-side, is an excavation made for repairing the roads, and the shale or slate here yields millions of fossils; this shale is calcareous, lying over the Old Red Sandstone, and at the base of the limestone.

Little Island is in Cork, four miles east of the city. The limestone here is light gray, and very pure, and contains abundance of fossils, of those usual in the lower limestone in other parts of Ireland, with this difference—that they are in general distorted, as are all the fossils in the limestone of this county, and also in the county of Waterford, and part of Kerry. If a line be drawn upon the map of Ireland, from Waterford to Kanturk, and produced from Kanturk to Killarney, all the fossils south of this line are distorted, both in the slates at the base of the limestone and in the limestone itself. This circumstance is likely to have some connexion with the violent convolutions and steep dip of the strata apparent in this part of the country, while it is quite otherwise in the midland counties, where the strata lie level, or nearly so. South of this line also, the soft black strata, which in the northern counties are shale, here deserve the name of slate, from superior hardness and distinct cleavage; even the massive limestone has strong cleavage lines.

Magheranore, in Sligo, is two miles east of the small town of Tobercorry. The limestone here has fossils, especially Lithodendrons, and other corals.

Magherenny, in Tyrone, is one mile S.E. of Drumquin. The limestone here is impure and siliceous, and belongs to the lower portions of the formation; it contains some fossils. *Bellerophon cornuarietis* is found here.

Malahide is in the county of Dublin, nine miles N.E. of the city. The rock here is calcareous slate, of which the limestone and shales are well exposed on the sea-shore, and yield a great vari-

ety and abundance of fossils. Opposite the new hotel, under high-water mark, is found *Pleurorhyncus aliforme*, which also occurs in rocks of similar lithological character at Poulscadden, and at Ballinacourty. *Pleurorhyncus fusiformis* is almost peculiar to this locality, only one other specimen having been found at Hook.

Manorhamilton is a small town in the county of Leitrim. Half a mile S.E. of the town there is a mill, and the stream which works it flows westward through black shale at the base of the limestone, which yields a good variety of fossils. The limestone occurs here also.

Meelick Chapel, Clare.—*See* Clonlara.

Meencarigagh, in Tyrone, is five miles S.E. of the town of Castlederg, on the Pettigo road. The black shale here affords a good variety of fossils.

Middleton is a small town, thirteen miles east of Cork. The gray limestone hereabouts contains the usual fossils, well preserved.

Millecent, in Kildare, is four miles north of Naas. The limestone here affords a profusion of fossils, and, as it is taken to Dublin by canal for economical purposes, those fossils have become better known than those of most other localities. Some of the beds appear to be formed of a mass of organic matter, which still contains many undescribed forms.

Miltown Malbay, in Clare, is on the western coast. About the town the rock is of the coal-measures of that county.

Milverton, in the county of Dublin, is one mile S.W. of Skerries. The light gray limestone of this place yields numerous varieties of fossils. *Euomphalus rotundatus* is plentiful.

Mohill is in Leitrim. The rock is calcareous slate hereabouts, and contains many varieties of fossils.

Monaduff is in Longford, six miles N.E. of Newtownforbes, and one mile N.E. of the village of Drumlish, at the southern base of Cairnclonhugh mountain. The limestone and calcareous slates of this locality afford the usual fossils of the lower beds, and, in addition, some beautiful spines and scales of fishes.

Monaghan is the chief town of the county of that name. The quarry at the infirmary is a gray limestone, very siliceous; it dips northward from the graywacke slate hills. It is of the

lower beds. It contains *Orthis crenistria*, and *Orthis Kellii*, but no other fossils were got in it at this place.

Moneyneany, in Londonderry, is seven miles west of Maghera, and four N.W. of Draperstown. A stream, which crosses the Dungiven road, forms the barony bounds here, and some red and purple shales overlying the Old Red Sandstone afford a few of the fossils found in the black shales.

Moore, in Roscommon, is three miles east of Ballinasloe. The light gray limestone of this district produces abundance of fossils.

Morera, in Leitrim, is four miles S.W. of Manorhamilton, on the Sligo road. Here, near the junction with the mica slate of Benbo mountain, fossils are found in the limestone and shale.

Moyheeland, in Londonderry, is five miles S.W. of Maghera. The village of Draperstown stands on part of this townland. On the south bank of the Moyola river, a few yards above the forge bridge, very fine specimens of fish remains are got in a bed of black shale, at about the summer level of the water. Scales of *Holoptychius Portlockii*, spines of Gyracanthus, and numerous large bones, were obtained; also a tolerably perfect specimen of a whole fish, somewhat farther up in the river, in a bed of black shale near the north bank. The black shale and slate in the Moyola at this place is part of a band which crosses the valley from Fallagloon on the N.E. by the forge bridge, to the White river on the S.W., being two to three miles long, and about a quarter of a mile wide. This band was supposed to be in the Old Red Sandstone, because that rock occurs to the west of it, and white sandstone to the east, at Gortahurk and other places, succeeded by gray mountain limestone near Desertmartin, all dipping the same way, eastward. The same species of fish remains occur in the black band ironstone near Glasgow, in the coal district there; and this circumstance, together with the colour and general lithological character of the shale itself, seems to be a presumption that this Moyola band of black shale is of the coal formation, and not belonging to the Old Red Sandstone. If so, it must be a mass which slipped down between two parallel faults, a circumstance not uncommon, and especially probable in a neighbourhood beset with dislocations. It has the basaltic protusions about Maghera covering it on the north-east end, and is terminated by the great greenstone of Slieve Gallion on the south west. Besides all this, a red sandstone covers this

gray band, near the north end in the Fallylea river, which I believe to be the New Red Sandstone. This rock often covers the coal formation, where that occurs, in all the country lying west of Lough Neagh, in its vicinity. *See* CULTRA.

MOYMORE is in Clare, seven miles east of Ennis, and two miles S.W. of the village of Tulla. The limestone about here affords many species of fossils, in a high degree of preservation.

MUCKRUSS, in Kerry, is three miles south of Killarney. Calcareous slate is got here, full of the usual fossils.

MULLAGH, in the county of Meath, is three miles north of Kilcock. The black shale of this locality abounds with the usual fossils of that subdivision of the formation.

MULLAGHBOY is in Monaghan, two miles east of the village of Emyvale. Fossils are abundant at this place.

MULLAGHFARRY, in Mayo, is one mile S.W. of Killala. The black shale and limestone abound with fossils in this locality.

MULLAGHFIN is in Meath, eight miles S.W. of Drogheda, and two miles west of Duleek. The limestone here is light gray, very fossiliferous, and the fossils come out of the rock in good preservation. Several species of Martinia, Reticularia, and Spirifera, are got here. There is one thick bed of limestone, composed altogether of a mass of *Spirifer Urii*, or *Spirifer unguiculus*, as it was called. Here also was got a specimen of *Producta maxima*, as large as a man's head.

MULLAGHTINNY is in Tyrone, half a mile east of Clogher. Here the black shales, in a stream that flows down the hill northward, afford a good display of the fossils usually found in it. Modiola, Nucula, Axinus, &c., are abundant, and the specimens good.

MULLALISS, in Monaghan, is two miles east of Emyvale. This locality contains many species of Producta, and other fossils in the limestone.

MULLAWORNIA, in Longford, is two miles N. W. of Ballymahon. Here is a pretty large hill of limestone, with fossils, on the bank of the Royal Canal.

MULLYLUSTY, in Monaghan, is four miles S.W. of Carrickmacross. This is a limestone locality, but not very rich in fossils.

MULNAHUNCH, in Tyrone, is five miles S.W. of Dungannon. The rock is limestone, and fossiliferous.

NENAGH is in Tipperary. There are quarries in the limestone, half a mile west of the town, in which fossils are got.

NEWCASTLE, in Tipperary, is eight miles east of Clogheen. The rock is dark-coloured slate, and fossiliferous.

OLD LEIGHLIN is in Carlow, seven miles S.W. of Carlow, and two miles west of Leighlinbridge. The limestone occurs here, and at its junction with the overlying millstone grit of the Castlecomer district, fossils are numerous, and some beautiful casts are found in old excavations, where the flinty limestone has been exposed to the weather.

OLDTOWN is in Dublin, one mile and a half N.W. of Swords. The limestone, of a light gray colour, shows itself here, and contains a good variety of the usual fossils. *Euomphalus pentangulatus* is abundant.

OUGHTERDRUM is in Fermanagh, three miles S.E. of Belleek, and six S.E. of Ballyshannon. The limestone occurs here, and is, as usual, fossiliferous.

PAGET PRIORY, in the townland of Mullagh, is four miles north from Kilcock. It is a locality of black slates of the millstone grit, and contains Posidoniæ and Goniatites.

POULSCADDEN, in the county of Dublin, comprises a little of the shore and rocks at low water, immediately south of Howth Harbour. The rock is calcareous slate, and has abundance of the usual fossils. The beds under high water are decomposed for nearly a foot inwards from the surface, and the fossils come beautifully marked out of them.

PRUGHLISH, in Tyrone, is three miles west of Drumquin. This is a black shale district, in millstone grit, which contains the usual fossils abundantly.

RAHAN'S BAY is in Donegal, on the sea-shore, one mile S.W. of Dunkineely village. The rocks here are exposed to the action of the waves, and yield an abundant supply of fossils. There are sandstone, some limestone, and much black shale.

RAHEENDORAN, in Carlow, is four miles S.W. of Carlow. The upper part of the limestone here yields some fossils. It is extensively quarried for tombstones and architectural work. One of the beds contains *Producta hemispherica* and *Producta comoides*, and the quarrymen call this the half-moon bed. Other fossils are found, but not plentifully.

RAHORAN, in the county of Tyrone, is two miles north of Fivemiletown. The fossils of the black shale here are got out in the finest state of preservation, and are very abundant. *Pterinea*

Thompsoni, a scarce fossil, is very plentiful here, and many new species. They are got in the bed of a stream which runs southward at this place.

RATHCLINE is in Longford, about one mile south of Lanesborough. This is all a limestone country, and yields a variety of fossils.

RATHGILLEN is in Meath, two miles north of Nobber. The limestone of this place contains a good variety of fossils.

RATHMOYLE, in Roscommon, is five miles south of Frenchpark. The limestone of this district yields some fossils: *Orthis filiaria* and some others are got in a good state of preservation.

REDBARN, in Armagh, is in the townland of Farmacaffley, a mile S.W. of the town. The limestone here yields fish remains of many species, similar to those found at Castle Espie and other places.

RING, in Fermanagh, is two miles N.E. of Enniskillen. A dark limestone here, which is interstratified with shale, contains many varieties of those fossils which are usual in the lower beds of limestone, as *Leptagonia analoga*, *Orthis crenistria*, &c. &c.

RINGASKIDDY, in Cork, is eight miles S.E. of Cork, on the shore, at the west side of Cork Harbour, opposite Spike Island. The calcareous slate, which is found here, yields a profusion of fossils.

RINGSTOWN is in the Queen's County, one mile and a half N.E. of Mountrath. Calcareous slate occurs here, which is full of the usual fossils. A limekiln was built here of the slaty rock, and when it had been in use some time was thrown down, and the calcareous slate, from the operation of the fire, gave out the fossils in the most beautiful state of preservation, often turned white, showing the most delicate markings of both corals and shells.

ROSCOMMON, in the county of Roscommon, is the chief town of the county. It stands on limestone of a light gray colour, which contains but few fossils. *Euomphalus cristatus* was got here in the quarries, half a mile west of the town.

ROUGHAN, in Tyrone, is four miles N.E. of Dungannon, on the Stewartstown road. There is much confusion in the stratification here, but the limestone, from its close proximity to the coal strata, is supposed to be of the upper part: it contains some fossils.

ROUNDWOOD is in the Queen's County, three miles N.W. of Mount-

rath. The calcareous slate of this place contains the usual fossils, and in abundance.

Rush, in the county of Dublin, is a village on the sea-shore, sixteen miles N.E. of Dublin, and seven N.E. of Malahide. This is a calcareous slate locality, and the rocks on the shore are well exposed; but it may be said of them generally that they contain very few fossils. The rocks in some places are very much contorted. Towards the south, near the village, there are a few beds of limestone in the black slaty rock, and there is one place, half a mile north of the village, where a bed of pure gray limestone, about nine inches thick, contains many of the fossils peculiar to the gray limestone; but to the north of this place, for a mile, no fossils were found.

Salmon, in Dublin, is three miles south of Balbriggan. The quarries here are in light gray pure limestone, like that at Milverton and Ballykea, and contain a variety of fossils.

Scariff, in Clare, is a small town, eight miles N.W. of Kilaloe, and nineteen miles east of Ennis. The town stands in a limestone valley, which runs east and west. The rock is fossiliferous.

Scraghy, in Tyrone, is six miles S.W. of Castlederg. This is a locality of shales, sandstones, limestones, and *ironstones*, and contains many fossils.

Shanbally, in Cork, is five miles S.E. of the city, and one mile S.W. of Monkstown. The calcareous slate here is full of fossils.

Shean, in Fermanagh, is on the west shore of Lough Erne, less than a mile north of the village of Churchhill. Black slate, which here comes in contact with a greenstone dyke, contains corals, which are all turned white near the dyke, but of the usual colour of the rock at a few yards distant.

Shrule, in Longford, is four miles N.E. of Ballymahon. This is a limestone and a fossiliferous locality.

Slane, in Meath, is a small town. Half a mile east of it are limestone quarries, which afford the usual fossils.

Spierstown, in Donegal, is two miles east of the town of Donegal, and north of the Londonderry road. The limestone and shales which occur at the base of the carboniferous limestone are found here, and contain fossils. *Athyris depressa* is got here plentifully.

St. Doulough's, in Dublin, is five miles N.E. of the city, on the Ma-

lahide road. A large limestone quarry is opened here. Over it is seen the base of the black flags and shales dipping southwards 10° to 20°. Under the limestone, in the centre of the quarry, an extremely fine-grained black shale or slate is found, which contains Productæ, Pectens, and other fossils, on which are seen the most beautiful and delicate markings under the magnifier. This must be the calcareous slate. The usual fossils occur in the limestone. Encrinite stems are most abundant in some of the upper beds. *Spirifer pinguis*, a fossil generally scarce, is abundant here.

St. John's Point, in Donegal, is on the north coast of Donegal Bay, fourteen miles N.W. of Donegal, and four miles S.W. of Dunkineely. The Point here is limestone, but the peninsula inwards is composed of the lower rocks along the shore; on both sides of this peninsula the rocks are unusually well exposed, and fossils abundant.

Streamhill is in Cork, three miles north of Doneraile, at the south base of the Galtee mountains.

Streedagh, in Sligo, is on the coast, ten miles N.W. of the town of Sligo. The lowest beds of the limestone occur here, and are well exposed. *Siphonophyllia cylindrica* occurs in great abundance, and very large specimens. A man might walk on the bed of the rock, stepping from specimen to specimen of this fossil for several hundred yards. The fossil is above two feet long, and two to three inches in diameter.

Swanlinbar, in Cavan, is ten miles S.W. of Enniskillen. This locality has both calcareous slate and limestone, as also millstone grit.

Swellan, in Cavan, is about a mile N.W. of the town of Cavan. The rock is calcareous slate, and has some fossils. They are, however, rather scarce.

Swineford, in Mayo, is a small town. It is on limestone, which is not extensively quarried hereabouts, but contains the usual fossils where it is seen.

Tankardstown, in the county of Cork, is six miles N.E. of Doneraile, and one and a half miles N.W. of Kildorrery. It is in a limestone locality, and very good fossils are got in it.

Termon, in Roscommon, is half a mile west of Boyle. There is a geological peculiarity in this place. The calcareous shale ap-

pears to be wanting. In the Termon quarry the beds of gray limestone are seen resting on yellow sandstone directly. These lowest beds of limestone contain a profusion of *Orthis papilliona-cea* and *Orthis crenistria*, with but few other fossils.

Tinnekill, in the Queen's County, is three miles N.E. of Mountmellick, on the Grand Canal banks. This is a fossiliferous limestone locality.

Tinnycahill, in Donegal, is two miles east of the town of Donegal, on the south side of the Londonderry road. The rock here is composed of limestone beds, with black shale interstratified. The limestone beds contain a variety of the fossils usually found in the lower divisions of the carboniferous limestone, as *Orthis crenistria*, *Leptagonia analoga*, &c.

Tirlicken, in Longford, is three miles N.W. of Ballymahon, on the banks of the Royal Canal. The limestone here is fossiliferous, and yields good specimens of Nautilus, Temnocheilus, &c. &c.

Toberory, in Roscommon, is two miles N.W. of the village of Tulsk on the French park road. The limestone here is oolitic, and contains a good variety of fossils.

Tonyelida, in Monaghan, is three miles north of Carrickmacross, on the mail-coach road-side. Good specimens of *Producta hemispherica*, and other fossils, are got here in the limestone.

Tonyshandenny, in Monaghan, is two miles N.E. of Emyvale. This locality is on the lower part of the limestone, and yields fossils.

Tornaroan, in Antrim, is on the sea-shore, one mile and a half east of Ballycastle. There are two beds of limestone here, under high-water mark, which dip south 8°, and contain fossils. The coal district of Ballycastle lies immediately over those beds, which, if that be millstone grit, would put them in the position of the upper part of the limestone; but they are indeed very unlike the appearance of this rock in other localities in Ireland. From the description given of the Scotch coal rocks about Burdiehouse, they appear to be almost identical with the Ballycastle coal district, and the fossils, both shells and fish remains, got lately in the Scotch coal rock, are the same as those found in the lower shales in the Irish carboniferous rocks, as at Cultra, Draperstown, Drumlish, Kesh, &c.

Tuberelathan.—*See* Cregganore.

Tullyard, in Armagh, is one mile north of the town of Armagh. The limestone here is fossiliferous.

Tullynagaigy is in Fermanagh, one mile and a half S.E. of Kesh. It is a lower limestone locality, interstratified with calcareous slate.

Tullyoran, is in the county of Leitrim, one mile east of Mohill. The rock is limestone, light gray, and very fossiliferous.

Tumpher is in the county of Tyrone, one mile S.W. of Stewartstown. The limestone has some beds of shale in it, which contain corals of various species. *Astrea crenulare* is got in very fine specimens.

Ussaun, in Leitrim, is half a mile west of Mohill, a little to the north of the road, in a stream; the black shale affords abundance of fossils of great variety and beauty.

Walterstown, in Meath, is seven miles S.E. of Navan. It is a millstone grit locality, and in the black shale are found three or four species of Posidonia.

Westport is a small town in the county of Mayo. Gray limestone occurs near the town, in a large quarry, which contains some fossils.

White River, in Londonderry, near Draperstown.—*See* Corick.

Whiting Bay is in the county of Waterford, two miles east of Youghal, and nine miles south of Dungarvan. The calcareous slate here affords numerous species of fossils, mostly in the state of casts, as is the case with all the slate fossils of the counties of Waterford and Cork, at least near the surface, where the slaty rocks have been partially decomposed.

LIST OF SEVERAL POST-TOWNS, WITH FOSSIL LOCALITIES IN THEIR VICINITIES.

Ardmore.—Ardoe, Curragh.

Armagh.—Annahugh, Ballygasey, Benburb, Calragh, Downs, Drummanmore, Enagh, Farmacaffly or Redbarn, Fellows' Hall, Kilmore, Tullyard.

Athenry.—Cappaghmoyle, Carrowntobber.

Athleague.—Lacken.

Balbriggan.—Courtlough, Flemingstown, Salmon.

Ballina.—About the town. Bunowna, Kilbride, Kilglass.

Ballinasloe.—Moore.
Ballinhassig.—Goggan's Hill.
Ballycastle, *Antrim.*—Tornaroan.
Ballycastle, *Mayo.*—Ballinglen, Bunatrahir, Doonfeeny, Kilbride.
Ballyconnell.—Quarries near the village.
Ballygawley.—Annaghilla, Fasglassagh, Knockonny.
Ballymahon.—Carrickboy, Cornadowagh, Kilcommock, Mullawornia, Shrule, Tirlicken.
Ballyshannon.—Abbeylands, Aghamore, Ardloughil, Drumnagroagh, Oughterdrum.
Banagher, *King's County.*—About the town.
Bantry.—Blackball Head, Gurteenroe.
Belfast.—Cultra.
Belleek.—Oughterdrum.
Belturbet.—Ballyconnel, Kilcar.
Benburb.—About the old castle, and in the canal banks.
Blacklion.—Fossiliferous limestone abounds here.
Blackrock, *Cork.*—The limestone hereabouts is fossiliferous.
Boyle.—Ballinafad, Cleen, Drumdoe, Grangemore, Lisardrea, Termon.
Bundoran.—The rocks on the shore adjoining. Aghamore.
Carlingford.—In the quarries near the town.
Carlow.—Old Leighlin, Raheendoran.
Carrickboy.—On fossiliferous limestone.
Carrickmacross.—Ardagh, Ballyhoe, Clonturk, Mullylusty, Tonyelida.
Carrick-on-shannon.—Killukin.
Carrigahorig.—The limestone cutting in the mill-race abounds in fine fossils.
Carrigaline.—Limestone fossiliferous. Killingly or Ballea.
Castlederg.—Edenasop, Meencarigagh, Scraghy.
Castle Island.—Fossils are found in the limestone about this place.
Castleknock.—Quarries near the village.
Castlemartyr.—Castlerickard.
Castlerea.—Kiltullagh.
Castletown, *Queen's County.*—Aghafin.
Cavan.—The quarries near this have a few fossils. Countenan, Laragh, Swellan.
Charleville.—Annagh.
Churchill.—Bohevny, Shean.
Church-hill.—Drumreask.
Clane.—Millecent.
Claremorris.—Cuilmore.
Clogheen.—Newcastle.
Clogher.—Aghintain, Aghnaglogh, Ballymacan, Lismore, Mullaghtinny.
Clonmel.—Limestone fossiliferous. Killinamack.
Cloone.—*Co. Leitrim.*
Collooney.—*Co. Sligo.*
Comber.—Castle Espie.
Cong.—The limestone hereabouts has fossils.

Cookstown.—Fossils occur in the quarries about the town. Clare, Derryloran, Donaghrisk, Kildress.

Coolaney.—Carrowmore.

Cork.—The limestone in the vicinity has fossils. Carrigaline, Cove or Queenstown, Killingly, Little Island, Middleton, Ringaskiddy Shanbally.

Corofin.—Clifden.

Crosmolina.—Largaunmore.

Derrygonelly.—*Co. Fermanagh.*

Donegal.—Ballybodonnel, Bruckless, Doorin, Dunkineely, Finner, Greaghs, Inver, Killaghtee, Laghy, Lisnapaste, St. John's Point, Spierstown, Tinnycahill.

Doneraile.—The limestone hereabouts fossiliferous. Castlecreagh, Fortwilliam, Streamhill, Tankardstown.

Draperstown.—Banada, Corick, Cullion, Dromard, Moneyneany, Moyheeland, White River.

Drogheda.—Mullaghfin.

Dromod.—Calcareous slates, fossiliferous; a few perches north of village.

Dromore West.—Cashelboy, Carrowmably, Carrowmacrory.

Drumcondra.—Ardagh, Balsitric.

Drumlish.—Monaduff.

Drumquin.—Cavansallagh, Curraghmore, Drumowen, Drumscraw, Glenbane, Lackagh, Magherenny, Prughlish, Scraghy.

Dublin.—Ardclogh, Cloghran, Malahide, Rush, St. Doulough's.

Duleek.—Mullaghfin.

Duncannon.—Hook Point or Hook Head.

Dundalk.—Kilcurry, Knockagh.

Dungannon.—Drumreagh Etra, Edenacrannon, Killymeal, Mulnahunch, Roughan.

Dungarvan.—Ardoe, Ballinacourty, Ballyduff, Clonea, Curragh, Whiting Bay.

Dunkineely.—Ballybodonnel, Bruckless, Killagtee, Rahan's Bay.

Easky.—Ballymeeny, Bunowna, Carrowmacrory, Carrowmably.

Ederney.—A pretty good locality.

Edgeworthstown.—Carrickboy.

Emyvale.—Killygrean Upper, Mullaghboy, Mullaliss, Tonyshandeny.

Ennis.—Moymore, Scariff.

Enniskillen.—Belmore Mountain, Blacklion, Carrowntreemall, Cornagrade, Derrygonelly, Florence Court, Knockninny, Ring.

Fermoy.—Araglin Bridge.

Fethard, *Wexford.*—Hook Point or Hook Head.

Fivemiletown.—Rahoran.

Frenchpark.—Rathmoyle.

Galway.—Athenry, Ballinfoile.

Glasslough.—Leck.

Gort.—Kilmacduagh.

Granard.—The calcareous slates about the town. Carrickduff.

Hollywood.—Cultra.

Howth.—Quarries, Poulscadden.

KANTURK.—Banteer.
KEADUE.—Carrownanalt, Cartronaglogh.
KELLS.—Horath.
KESH.—Ardatrave, Augharainy, Bannaghbeg, Bunaninver, Carn, Carrickoughter, Clareview, Cleenishgarve, Corlave, Crevenish, Curraghmore, Deerpark, Derrynacapple, Drumbrick, Drumcurren, Drumgowna, Drumkeeran, Ederny, Gubbaroe, Tullynagaigy.
KILCOCK.—Mullagh or Paget Priory.
KILDARE.—Boston.
KILDORERRY.—Tankardstown.
KILLALA.—Ballinglen, Bunatrahir, Crosspatrick, Doonfeeny, Killybrone, Kilcummin, Killogunra, Mullaghfarry.
KILLARNEY.—Brickeen Bridge, Muckross.
KILLESHANDRA.—Quarries near the town.
KILMALLOCK.—Chicken-hill.
KINSALE.—Ballymakean, Hole-open Bay.
LAGHEY.—Greaghs, Lisnapaste.
LANESBOROUGH.—Rathcline.
LEIGHLIN BRIDGE.—Bannaghagole, Old Leighlin.
LIMERICK.—Cloonlara or Meelick.
LISBELLAW.—Killycloghy.
LOUGHGALL.—Annahugh.
LOUGHREA.—Caheratrim, Cregganmore or Toberelathan.
MAGHERA.—Ballynure, Cullion, Desertmartim, Dromard, Fallagloon, Moneyneany, Moyheeland.
MALAHIDE.—Along the shore. Curkeen, Rush, Ballykea, Feltrim.
MALLOW.—In the quarries south of the town.
MANORHAMILTON.—Morera.
MARYBOROUGH.—Burris.
MOHILL.—About the town. Tullyoran, Ussaun.
MONAGHAN.—Dundonagh.
MOUNTMELLICK.—Tinnekill.
MOUNTRATH.—Aghafin, Ringstown, Roundwood.
MOYNALTY.—Horath.
NAAS.—Millecent.
NAUL.—Flemingstown.
NAVAN.—Cusackstown, Walterstown.
NENAGH.—About the town.
NEWTOWNFORBES.—Monaduff.
NOBBER.—Altmush, Balsitric, Cregg, Cruicetown.
PETTIGO.—Boa Island.
PORTUMNA.—Ballyhanry, Carrigahorig.
RATHANGAN.—Boston.
ROSCOMMON.—About the town.
RUSH.—Ballintree, Ballykea, Curkeen.

Scariff.—Quarries in the valley.
Skerries.—Ballykea, Curkeen, Drumlattery, Lane, Milverton, Salmon.
Slane.—At quarries.
Sligo.—Cashelboy, Culleenamore or Knocknarea, Streedagh.
Stewartstown.—Has limestone quarries around. Tumpher.
Stradone.—Countenan, Laragh.
Strokestown.—Toberory.
Swanlinbar.—Aghaboy, Alteen.
Swineford.—Is on limestone.
Swords.—Oldtown.
Tempo.—Leam.
Tobercorry.—Carrowmore, Magheranore.
Tralee.—Ballymacelligot, Currens.
Trim.—Castletown, Laracor.
Tulla.—Moymore.
Tullyhog.—Donaghrisk.
Tulsk.—Toberory.
Virginia.—Clonkeiffy.
Waterford.—Hook Head, or Hook Point, in County Wexford, Dunkit.
Westport.—Quarries near the town.
Youghal.—Ardoe, Whiting Bay.

ADDENDA.

Since the first of the foregoing sheets was put to press, it was found that a number of fishes, got in the Irish mountain limestone, and mostly from Captain Jones's Collection, have been described by Mr. Frederick M'Coy, in the Annals of Natural History for 1848. They are enumerated in the following list:—

Name.	Authority.	O. R. S.	Cal. Sl.	Limest.	Coal.	Localities.
Asteroptychius semiornatus.	M'C. A. N. H.	.	.	*	.	Armagh.
Asterolepis verrucosa.	M'C. A. N. H.	.	.	*	.	Armagh.
Chelyophorus Griffithii.	M'C. A. N. H.	.	*	.	.	Cultra.
Chomatodus denticulatus.	M'C. A. N. H.	.	.	*	.	Armagh.
,, obliquus.	M'C. A. N. H.	.	.	*	.	Armagh.
Cladodus lævis.	M'C. A. N. H.	.	.	*	.	Armagh.
Coccosteus carbonarius.	M'C. A. N. H.	.	.	*	.	Armagh.
Colonodus longidens.	M'C. A. N. H.	.	.	*	.	Armagh.
Cosmacanthus carbonarius.	M'C. A. N. H.	.	.	*	.	Armagh.
Ctenacanthus denticulatus.	M'C. A. N. H.	.	*	.	.	Drumlish.
,, distans.	M'C. A. N. H.	.	.	*	.	Armagh.
Dipriacanthus falcatus.	M'C. A. N. H.	.	.	*	.	Armagh.
,, Stokesii.	M'C. A. N. H.	.	.	*	.	Armagh.
Erismacanthus Jonesii.	M'C. A. N. H.	.	.	*	.	Armagh.
Glossodes lingua-bovis.	M'C. A. N. H.	.	.	*	.	Armagh.
,, marginatus.	M'C. A. N. H.	.	.	*	.	Armagh.
Gyracanthus obliquus.	M'C. A. N. H.	.	*	.	.	Moyheeland.
Helodus appendiculatus.	M'C. A. N. H.	.	.	*	.	Armagh.
,, rudis.	M'C. A. N. H.	.	.	*	.	Armagh.
Homacanthus macrodus.	M'C. A. N. H.	.	.	*	.	Armagh.
,, microdus.	M'C. A. N. H.	.	.	*	.	Armagh.
Isodus leptognathus.	M'C. A. N. H.	.	*	*	.	Moyheeland.
Nemacanthus priscus.	M'C. A. N. H.	.	.	*	.	Armagh.
Orodus compressus.	M'C. A. N. H.	.	.	*	.	Armagh.
,, porosus.	M'C. A. N. H.	.	.	*	.	Armagh.
Osteoplax erosus.	M'C. A. N. H.	.	*	.	.	Cultra.
Physonemus arcuatus.	M'C. A. N. H.	.	.	*	.	Armagh.
Platycanthus isosceles.	M'C. A. N. H.	.	.	*	.	Armagh.
Polyrhizodus pusillus.	M'C. A. N. H.	.	.	*	.	Armagh.
,, magnus.	M'C. A. N. H.	.	.	*	.	Armagh.
Psammodus canaliculatus.	M'C. A. N. H.	.	.	*	.	Armagh.
Psammosteus granulatus.	M'C. A. N. H.	.	.	*		River Banagh, near Kesh.
,, vermicularis.	M'C. A. N. H.	.	*	.	.	Fallagloon.

The Society met on the 13th of June, 1855, on which occasion the following Paper was read.

NOTES ON THE CLASSIFICATION OF THE DEVONIAN AND CARBONIFEROUS ROCKS OF THE SOUTH OF IRELAND. BY J. BEETE JUKES, ESQ., AND J. W. SALTER, ESQ.

The authors, during the last month, had examined some of the principal sections in the south of Ireland, where the base of the Carboniferous rocks and the upper part of the Old Red Sandstone are to be seen: paying especial attention to the palæontological evidence. They have arrived at the conclusion, that it is impossible to separate the so-called "Yellow Sandstone" of the south from the Old Red Sandstone, on account of their physical union alone. The upper part of the Old Red Sandstone has, interstratified with the *red* sandstones, shales, and slates, certain beds of green and yellow shales, slates, and sandstones; and in these green and yellow shales, wherever they occur, and however deep down in the Old Red, are found remains of plants, chiefly *Knorria dichotoma* (Haughton), along with which are certain linear plants, generally branched, often with marks of a central pith, and bearing on the whole a stronger resemblance to succulent roots than to any other portions of vegetables. These are, probably, the *Filicites dichotoma* of Professor Haughton. In two places, namely, at Kiltorkan Hill, near Thomastown, and at Tivoli Villa, near Cork, large shells, *Anodon Jukesii* (Forbes), have been found with these plants, but no other mollusca have, as yet, been discovered in these beds. In both these localities, as also in others farther west, the *Cyclopteris Hibernica* is found abundantly. A species, or perhaps two, of Stigmaria, is not uncommon, but there appears to be no undoubted evidence of the occurrence of Sigillaria or Lepidodendron, although the scales of fructification of a Lycopodiaceous plant have been found both at Kiltorkan and near Cork. The "Yellow Sandstone," with these characters, forms the upper part of the Old Red Sandstone all along the south of Ireland, from the Hook in Wexford to the shores of Bantry Bay.*

* This "Yellow Sandstone" is obviously distinct in many lithological characters, as well as in fossils, from the Yellow Sandstone of the north of Ireland, as described by Dr. Griffith, that of the north being undoubtedly the base of the Carboniferous system there.

Above this "Yellow Sandstone," which, perhaps, will be best called Upper Devonian, comes the Carboniferous Slate, a series of dark-bluish gray, sometimes black, slate, frequently interstratified with hard gray grits. This group is very thin towards the east, but thickens out westwards to very large dimensions, being not less than 5000 feet on the shores of Bantry Bay. The lower part of this mass forms a sub-group of hard thick gray grits, interstratified with black slates, which have been called "Coomhola grits," from a valley near Glengariff, where they are well seen. The thickness of this subordinate group, at Coomhola and Glengariff, is about 3300 feet. The Coomhola grits differ but very little from those of the Upper Devonian. The colour of the Coomhola grits, however, is generally a purer gray, while those of the Devonian have a slight greenish tinge. The only physical characters by which it is possible in all cases to separate the two groups are the occurrence of black slate partings in the Coomhola, or Carboniferous grits, and their absence from those of the Old Red Sandstone, whether upper or lower, in which the slates between the gritstones are green, yellow, pale gray, and almost all colours except black.

The fossils in the upper portion of the Carboniferous slate do not differ, except in the absence of certain forms, from those of the Carboniferous limestone. The most usual forms are Fenestella, probably the *F. plebeia*, and Encrinites, species of the genera Actinocrinus, Platycrinus, and Poteriocrinus, and even Rhodocrinus, identical with those of the Hook limestone and the Carboniferous shales of Pembrokeshire. With these, *Spirifer disjunctus* (Sowerby), and *Spirifer cuspidatus*, occur in great numbers, so that they may be considered the characteristic shells of the formation, and they are very often accompanied by *Orthis filiaria*, *Strophomena crenistria*, *Athyris squamosa*, a species of Productus, and everywhere by the *Rhynconella pleurodon*. A smooth species of Orthoceras, a Nucula, and the *Modiola M'Adami*, occur. In certain localities, especially near Cork, the latter shell is very abundant.

The grit beds in the Carboniferous Slate, and especially in the lower part of it, are usually covered with annelid tracks, and many of them are permeated throughout by small branched fucoids. The nature of these is doubtful, and they may be merely worm tracks, but they are well worthy of notice from their great abundance, and from their being equally characteristic of the Lower Limestone shales in Pembrokeshire.

In the western part of the county of Cork, as at Dunworley Bay, Dirk Bay, and, near Skibbereen, the Coomhola grits contain a very remarkable assemblage of fossils. Together with some species of Actinocrinus, identical with those from the Carboniferous rocks, *Rhynconella pleurodon*, *Spirifer cuspidatus*, and *Spirifer disjunctus* (or at least the variety of that Spirifer which is commonly called *Spirifer Verneuilli*), there have been found numerous bivalve shells, most of them of new species, and some of them apparently of undescribed genera. These shells belong to Modiola, Cucullæa, Avicula, Aviculopecten, Axinus, Nucula, and a new genus for which the name of Curtonotus (Salter) is proposed. The latter is peculiarly characteristic and abundant; it is also found on the same horizon in Pembrokeshire and North Devon. Bellerophon, rounded, sharply keeled, and trilobed species, with spiral shells and Orthoceras, and a new Lingula of large size, are not unfrequent. The Cucullææ are large, and appear to be distinct species from those of North Devon; but the *Avicula Damnoniensis* is identical with the English species, and *more abundant in the above localities than any other shell.* The *Rhynconella pleurodon*, both of large and small size, is also very abundant.

In the section of the Glen of Coomhola, and along the shores near Glengariff, these beds are better exposed, and more accessible, than in any other spot. A close search in them discovered abundance of the shells above mentioned, at least of the characteristic Avicula, and also the *Cucullæa trapezium* of Devonshire. Nor were the plants absent, for large specimens of the *Knorria dichotoma* occurred at intervals throughout the Coomhola grits, as well as in the shales of the Upper Devonian below them.

The evidence, therefore, so far as it has yet been collected throughout the south of Ireland, would point to the following conclusions:—

First, that no marine remains are to be found in the "Yellow Sandstone" of the south of Ireland, which is the upper part of the Old Red Sandstone, but that the same species of plants are found throughout it wherever there are green shales or slates, or yellowish sandstones, present in it.

Second, that the Carboniferous slate, whether more or less developed, contains, throughout all its upper portion at least, the ordinary Carboniferous types, as long ago stated by Dr. Griffith.

Thirdly, that a considerable, but locally developed group of

sandstones, more or less interstratified with black or dark gray slate, intervenes between these two series, physically more connected with the base of the Carboniferous system, but palæontologically distinct. This group contains the characteristic plants of the Upper Devonian, and some at least of the shells of the Carboniferous limestone, together with numerous species, especially of the Avicula and Cucullæa, peculiar to itself. Some facts, not yet fully worked out, would indicate a still closer connexion with the Carboniferous Fauna.

These beds, whether they be eventually identified with the typical Yellow Sandstone of Dr. Griffith, as developed in the north of Ireland, or whether that may be more truly represented by the Carboniferous slate above them, may still remain as a separate group, either as lowest Carboniferous, or uppermost Devonian. In the meantime the authors prefer to leave them under the designation, in the south of Ireland, of the Coomhola grit series. They are clearly the equivalents of the Marwood sandstone of Sedgwick and Murchison, a group which has been recently shown by one of the authors to underlie the Carboniferous slate of North Devon.*

As an instance of the partial and local development of these rocks, the authors describe the great change to be found in them in the Kenmare Valley, only ten miles north of Glengariff, in a straight line. At Roughty Bridge there is not a greater thickness than 50 or 60 feet between the red slates and sandstones of the upper Old Red, and the solid crinoidal limestones of the Carboniferous limestone. These 50 or 60 feet consist of dark gray slates above, and thick gray and greenish grits below, the very uppermost beds of slate having calcareous courses and fossiliferous bands, the organic remains in which are true Carboniferous fossils. This diminution in thickness in the Carboniferous slate group, from 5000 to 50 or 60 feet in the course of ten miles, is not an apparent diminution, the result of faults and dislocations, but a real one. The beds are all excellently shown in several convolutions round a small separate trough of limestone, distinct from the main mass of limestone of the Kenmare Valley, which little trough runs for about half a mile east of Roughty Bridge, as shown by Mr. W. S. Willson in his recent survey of the ground.

P. S. March, 1856.—Since the above was written, the authors are more decidedly inclined to look on the locally developed group,

* Journal, Geol Soc. London: Anniversary Address, 1855.

above described under the designation of Coomhola grits, as undoubtedly Carboniferous; and, therefore, on the *Avicula Damnoniensis*, the Cucullææ, and the other shells, as Carboniferous species. The Knorria and some other plants occur in these beds, as well as in those below them, namely, the variegated series of the upper part of the Old Red Sandstone, to which, so far as is yet known, the *Cyclopteris Hibernica* and the Anodon are confined.

The Society met on the 12th of December, 1855, on which occasion the following Paper was read.

ON THE OCCURRENCE OF PERMIAN MAGNESIAN LIMESTONE AT TULLYCONNEL, NEAR ARTREA, IN THE COUNTY OF TYRONE. BY PROFESSOR WILLIAM KING, QUEEN'S COLLEGE, GALWAY.

At the Belfast Meeting of the British Association, held in 1852, I read a short paper "On the Permian Fossils of Cultra," which was hastily got up from an inspection of some specimens in the collection of my friend, Mr. James M'Adam, of Belfast, who kindly placed them at my disposal for description.

Cultra is situated near Hollywood, on the south shore of Belfast Lough.

At the time my paper was read, I was simply aware that the Cultra beds yielding the "Permian fossils" had been described by Mr. James Bryce as of the same age as the magnesian limestones of the north of England; and that Dr. Griffith, on the contrary, considered them to belong to the Carboniferous System; but I was not acquainted with any of their published papers on the subject.

Several months afterwards, on reading over Mr. Bryce's pamphlet, prepared for the occasion of the Belfast Meeting of the British Association, and entitled, "Geological Notices on the Environs of Belfast, the East Coast of Antrim, and the Giant's Causeway" (1852), I saw for the first time an account of the "Permian Strata of Cultra."* About the same period I also became acquainted with

* Op. cit., pp. 20–22.—Since writing the above I have received from Mr. M'Adam, part iii., vol. i., of the Journal of the Geological Society of Dublin, 1837, containing Mr. Bryce's first paper, entitled, "On the Magnesian Limestone and Associated Beds which occur at Hollywood, in the County of Down," and read April 8, 1835.

the abstract of Dr. Griffith's paper "On the Lower Portion of the Carboniferous Limestone Series of Ireland," published in the British Association Report of the Cork Meeting, held in 1843. It appears by this paper, that Dr. Griffith had previously considered the Cultra beds as belonging "to the New Red Sandstone and Magnesian Limestone group;"* but from a re-examination of them a short time before the meeting, he became "decidedly of opinion" that they are coeval with certain carboniferous beds in the valley of Ballinascreen. In the abstract, the Cultra beds are described as consisting of "fine-grained red and bright yellow calcareous sandstone, containing some beds of bright yellow fossiliferous dolomite, containing casts of *Cucullæa complanata*, *C. unilateralis*, *C. Hardingii*, *C. trapezium*, *Pullastra antiqua*, with Nucula, Cypricardia, and some obscure univalves."† It is necessary to observe, that most of these names belong to fossils previously described by Mr. J. de C. Sowerby, and found in the Old Red Sandstone (Upper Devonian) of Marwood, in North Devon. The identification of the Cultra fossils with upper Devonian types will somewhat explain why my determination of their being Permian, as announced at the Belfast Meeting, met with some opposition.‡

The Cultra fossils noticed in my paper were *Schizodus Schlotheimi*, *Pleurophorus costatus*, and *Bakevellia antiqua*.§ As regards the identifications given in Dr. Griffith's paper, I have no doubt, if the fossils on which they were made were re-examined, that they would be found to agree with the Permian species just named. Mr.

* I find this opinion expressed in Dr. Griffith's Anniversary Address delivered at the Fifth Annual Meeting of the Geological Society of Dublin, and published in the Journal above quoted. Reviewing Mr. Bryce's paper, the Doctor observes:— "This limestone has been long known, though not hitherto described; it is peculiarly interesting as being the only locality in Ireland in which magnesian limestone has been discovered immediately underlying the New Red Sandstone; and though its area is small, still, its geological position is important, and deserves consideration."— *Journal of the Geological Society of Dublin*, vol. I., part iii., page 146.

† Report of the British Association for 1843, Cork Meeting, part ii., page 46.

‡ From a statement made by Mr. Kelly in his paper "On Localities of Fossils of the Carboniferous Limestones of Ireland," recently published in the Journal of the Geological Society of Dublin, vol. VII., part i., page 23, it appears that my principal opponent at the Belfast Meeting, Professor M'Coy, named the Cultra fossils in Dr. Griffith's list. (March 12, 1856.)

§ Report of the British Association for 1852, Belfast Meeting, part ii.

Binney, of Manchester, who examined the Cultra deposit in question, in 1852, has lately published a paper "On the Permian Beds of the North-West of England." Briefly noticing the geology of Cultra, this gentleman observes:—"However, past Cultra landing-place there is, beyond all doubt, as good a magnesian limestone as any in Yorkshire, containing shells of the genera Schizodus and Bakevellia."*

The determination which I came to as to the age of the Cultra "fossiliferous dolomite" is remarkably confirmed by the occurrence in county Tyrone of a perfectly analogous deposit, the relative position of which clearly proves it to belong to the Permian System.

My attention was first drawn to this deposit on accidentally seeing, in August last, a small collection of fossils in the Dublin Museum of Irish Industry, unnamed, but labelled as having been found "near Artrea, county Tyrone."† As the specimens were under lock in a glass-case I could not examine them sufficiently; but feeling convinced that they were true Permian species, I resolved on visiting, at my earliest opportunity, the locality indicated on the label.

In September last I went down to Artrea, and after a little trouble succeeded in finding the deposit I was in search of exposed in a small quarry a few yards square, at about a hundred yards or so north of the road leading from Artrea to Annaghone, where it passes along the northern base of Tullyconnel Hill. The deposit consists of a well-characterized magnesian limestone, of a yellowish brown colour and a somewhat gritty feel,‡ closely agreeing in these respects with the magnesian limestone occurring on the coast of Durham. It also corresponds with much of the Zechstein dolomite in Germany.

My attention was drawn to the quarry by some magnesian limestone blocks in an old wall on the road side adjoining a dilapidated

* Memoirs of the Literary and Philosophical Society of Manchester, vol. xii.

† Mr. Jukes informs me that the late Professor E. Forbes placed the Artrea fossils in the Museum by themselves, with a label "Permian?" This label, however, entirely escaped my notice.

‡ It is occasionally of an oolitic texture, and contains small portions of quartz, seldom exceeding half an inch in size. Mr. Jones, to whom I sent portions of the limestone containing the remains of Entomostraca for examination, remarks:—"It is curious to observe the quartz grains in the rock, and how sometimes they become partially coated, like the nuclei of the minute oolite grains."

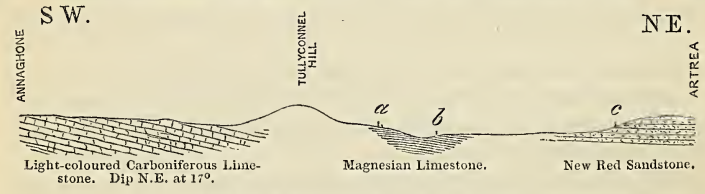
cottage. This quarry is the only place where I observed the rock *in situ;* but Mr. Slorne, who lives on the opposite or south side of the Hill, informed me that the same limestone was formerly worked immediately adjacent to the dilapidated cottage. I think it was from the latter place that Mr. Slorne procured a large number of stones built into the front wall of his house, and crowded with one or two species of fossils.

About a mile to the north of the quarry, and just before ascending the hill on which the rectory of Artrea is situated, some beds of a dark red freestone are worked, evidently a portion of the so-called "New Red Sandstone," which forms so much of the surface rock in the north of Tyrone.

Returning to the south, Tullyconnel Hill itself is so masked with drift, that I was unable to ascertain the nature of its constituent rock; but the general impression in the neighbourhood is, that it consists of a freestone similar to that which occurs near the rectory of Artrea—a view somewhat countenanced by the occurrence of a bed of deep-red freestone at the bottom of a well in Mr. Slorne's yard. Several blocks of this rock were lying about the mouth of the well at the time of my visit.

At Annaghone, situated about a mile further south on the road leading to Stewartstown, beds of carboniferous limestone, with several of its characteristic fossils, are exposed, dipping to the north-east, at an angle of about 17 degrees.

Owing to so small a portion of the magnesian limestone being visible, there is a difficulty in ascertaining its inclination; but as it lies in the direction of the dip of the carboniferous limestone beds at Annaghone, there cannot be any doubt of the latter passing under the former, as represented in the annexed section. Respecting the red freestone near Artrea rectory, I have represented it, in accord-



Section from Annaghone to Artrea.

a. The dilapidated cottage adjoining the road leading from Artrea to Tullyhog.
b. Site of the magnesian limestone quarry situated in Mr. Beatty's field.
c. Quarry of red freestone at the base of the hill near Artrea.
N. B.—The section does not extend to the Annaghone quarries and limekiln; merely to an outcrop of Carboniferous Limestone on the road, a little to the north of them.

ance with the views of Griffith and Portlock, as "New Red Sandstone," and consequently overlying the magnesian limestone; but the former may really be older than the latter, in which case it would have to be considered as equivalent to the "Rothe-todte-liegende" of the Germans. According to this view, the magnesian limestone would be a mere patch reposing in a hollow of the red sandstone. The section does not take into account the freestone bed found in Mr. Slorne's well, as the locality is a little too east of the line. As to whether or not Tullyconnel Hill consists of a similar freestone, I candidly confess my inability to come to any positive conclusion on the matter. I am in hopes, however, that Mr. M'Adam, who is at present working out the geology of the Artrea and surrounding districts, will succeed in obtaining sufficient data to enable him to settle the question.

The absence of coal-measures (a patch of which occurs near Annaghone, not much more than a mile to the south of Tullyconnel) in the section may be attributed to denuding agents having removed them before the deposition of the magnesian limestone; but I cannot refrain from hazarding the suggestion, that there runs through Tullyconnel Hill an enormous fault, which has thrown down the carboniferous limestone, coal-measures, and magnesian limestone far below their original level. A somewhat similar phenomenon occurs at Cullercoats and Whitley, on the coast of Northumberland, a little north of the Tyne, where the celebrated ninety-fathom dyke has thrown down the "Rothe-todte-liegende," marl slate, and magnesian limestone; thus preserving these members of the Permian System as an outlier, wedged in among the coal-measures.

With the exception of Colonel Portlock's "Report on the Geology of the County of Londonderry, and of parts of Tyrone and Fermanagh," 1843, I have not been able to consult any works referring to the geological structure of the Artrea district. Probably Dr. Griffith may have noticed it in some of his Reports. In his Geological Map of Ireland, however, the district in question has the colouring of "New Red Sandstone," which leads me to suppose that the "fossiliferous dolomite" has been overlooked, or included in the Saliferous System.

Colonel Portlock's "Report" contains a notice which evidently refers to the Tullyconnel Permian deposit. Speaking of the coal-measures and mountain limestone of Annaghone, the Colonel observes:—"And a little to the north, geologically overlying the

limestone, there is a remarkable yellow vesicular sandstone, the true relations of which cannot at present be determined."* I have no doubt this passage refers to the magnesian limestone of Tullyconnel; and that through some mistake it has been called a "sandstone;" or, perhaps its grittiness and a hasty examination of it may have given rise to the idea of this deposit being an arenaceous rock. That there is an error in the passage quoted appears evident; for in the Geological Map appended to Colonel Portlock's "Report," the district of Tullyconnel is coloured pale-yellow, and marked "3 A l," signifying a calcareous rock associated with the carboniferous strata. Furthermore, the Colonel elsewhere refers to Tullyconnel as being a townland "in which limestone may be procured" for economical purposes, "though at present obtained in other localities."† I have every reason for supposing that this oversight or inadvertency has arisen in consequence of Colonel Portlock having been suddenly called on to close his Report, from his services being required in another quarter.

The fossils from "near Artrea," in the Museum of Irish Industry, I have been informed, were collected by one of the officers assisting Colonel Portlock in his survey.

The Tullyconnel magnesian limestone so closely resembles that with which I have been familiar from my very childhood, that I felt no difficulty whatever in recognising fragments of it in the old wall; and no sooner had I applied my hammer to them than several specimens of fossils, with which I was perfectly acquainted, lay before me. Having worked at the Zechstein fossils in the heart of Germany, and having made those occurring in Durham an especial study, my feelings may be imagined when I first saw their exact representatives in a district forming the almost westernmost boundary of Europe.

As I was little more than an hour in the neighbourhood of Tullyconnel, doubtless all the species which occur there did not fall under my notice; but most of the specimens I collected are in such a state of preservation, that I have little doubt the determinations I have made of them will be found to be for the most part correct. On acquainting Professor Jukes with my discovery, he at once took a lively interest in it, and kindly forwarded to me for examination all the specimens in the Museum of Irish Industry. This has

* Op. cit., p. 583. † Op. cit., p. 674.

enabled me to examine some examples in a more perfect condition than any of my own. The Museum specimens do not represent so many species as occurred to me; I have, however, added to the collection all the desiderated forms belonging to myself.

I now purpose noticing the Tullyconnel fossils; but I have in the first place to express my obligations to the Council of the Society for enabling me to give representations of all the species—a kindness which has necessarily caused an outlay exceeding the sum usually allowed in such cases.

1. Spirillina pusilla* = *Serpula pusilla*, *Geinitz.*—Pl. i., fig. 12 a, b; Monograph, pl. vi., figs. 7–9, and pl. xviii., fig. 13 a, b, c, d.†

   This singular fossil has lately been ascertained by Mr. T. Rupert Jones to be a species of Spirillina,—a genus of the Agathistegian group of Rhizopoda. He purposes describing it more fully on some other occasion. All the specimens that have occurred to him are casts, which consist of an oblong coil of subcylindrical wire-like folds. A central irregularly twisted mass, of about $\frac{1}{50}$ inch in diameter, is inclosed in eight or more outer folds, which are flat or slightly concave on their internal surface, and convex externally; they are arranged longitudinally, not all on the same plane, but, with the exception of the outermost folds, cross each other at the extremities of the coil at nearly right angles. The size of the folds gradually increases from within outwards, but it is subject to irregularities, and frequently the folds are contracted where they bend over the ends of the coil. The species, probably, was free and unattached.

   A very pretty specimen was found in the Tullyconnel limestone, having one or two more folds than any of those figured in my Monograph, and with the outer folds more regularly arranged on one plane.

   It is of frequent occurrence in the Magnesian limestone of Humbleton Hill, near Sunderland. Geinitz found it in the Zechstein of Corbusen, in Germany; and M. Robert Eisel, Jun., informs me, that it occurs at Gera, in the Grauer Mergel-zechstein, which there overlies the great fossiliferous Zechstein.

2. Favosites Mackrothii, *Geinitz.*—Pl. i., fig. 10, a, b; Monograph, pl. iii., figs. 3–6.

   This is a small branching coral, the branches consisting of numerous slender, round, or polygonal transversely wrinkled tubes, rising perpendicularly in the centre, and afterwards suddenly curving out to the surface.

   The specimens of this fossil occurring at Tullyconnel, where it appears to be

---

* I am indebted to my friend Mr. T. Rupert Jones for an account of this fossil and the *Cythere inornata*. He has also kindly supplied me with the figures representing them.

† This reference is to my "Monograph of the Permian Fossils of England," 1850, published by the Palæontographical Society.

not uncommon, show that it often grew over the surface of dead shells, forming a basal stratum, out of which rose up, here and there, a few plume-like branches. Of the two specimens represented under fig. 10 a, the slender one appears to have attached itself to the inside of a *Mytilus squamosus*, and the other to the outside of another shell. The specimen figured at 10 b shows very distinctly the arrangement of the tubes, as displayed on a longitudinal section magnified.

None of the specimens exhibit the transverse plates and septal foramina characteristic of the genus, as represented in pl. iii., fig. 6, of my Monograph, which is to be regretted; inasmuch as some additional evidence seems to be required to prove that the species belongs to the genus Favosites. Messrs. Edwards and Haime consider it to belong to Chætetes.

Favosites Mackrothii is rather common in the Permians of Durham and Germany.

3. Thamniscus dubius = *Keratophytes dubius*, *Schlotheim*.—Pl. i., fig. 11; Monograph, pl. v., figs. 7–12.

A single fragment, little more than a quarter of an inch in length, is all that I have found of this Hornera-like fossil; but it is distinct enough to enable me to make the present identification. The genus *Thamniscus* is a low, irregularly-branching Bryozoon, the branches of which bifurcate irregularly: they are celluliferous on one side; while the other consists of a plate serving as a base for the cellules. In the species under consideration, the cellules are arranged in rows, of which there are from three to six on the branches. The Tullyconnel specimen is a portion of a branch, apparently divided at one (the upper) end, and exhibiting casts of three rows of cellules. *Thamniscus dubius* occurs in the Permians of Durham and Germany.

4. Mytilus squamosus, *J. de C. Sowerby*.—Pl. 1., figs. 3 a, and 36; Monograph, pl. xiv., figs. 1–7.

This fossil might at first glance be considered as having a close resemblance to some small varieties of the common mussel of our coasts; it is, however, very distinct, being inequivalved, having a widish furrow for the reception of the cartilage, and a septum in the umbonal cavity of both valves. The last character is always exhibited in good casts, which show an impression of it at the anterior termination of the hinge, as in fig. 3 a. The specimen referred to shows the posterior adductor muscular impressions, and a portion of the pallial scar. Some specimens are wider than others; but all the varieties may be easily distinguished from another Permian species—the *Mytilus septifer* —apparently only found in the North of England.

This fossil is abundant in the Tullyconnel magnesian limestone: some of the stones in the front wall of Mr. Slorne's house are crowded with specimens, many of which are an inch and a half long, the largest I have seen. It is a characteristic species of the Permian rocks of England (Durham), Germany, and Petchora land in Russia.

5. Bakevellia antiqua = *Avicula antiqua*, *Münster*.—Pl. i., figs. 4 a, b, c, d; Monograph, pl. xiv., figs. 28–34.

This species has much the aspect of an Avicula, to which many palæontologists have referred it; specimens, however, have occurred to me completely proving it to possess characters diagnostic of a new genus, having some relation to Modiola, and merely a similitude to Avicula. Thus Avicula possesses only one adductor muscle, whereas Bakevellia has been furnished with two, the impressions of which are displayed on the specimen (cast) represented, twice the natural size, under figure 4 c: they are also visible, but not so clearly, in the specimen figured at 4 b. The two muscular impressions are connected by a simple pallial scar, exhibited in figure 4 c. The dental characters, which consist of two elongated teeth—one on each side of the umbone—are well displayed in the cast represented under fig. 4 b. The genus possesses a cardinal area, with three or more cartilage pits (as in Gervillia, Catillus, &c.), which are exhibited in the specimen last referred to.

Bakevellia antiqua is rather tumid, inequivalve; seldom having its hinge line exceeding three-quarters of an inch in length: the surface of the valves, as shown by their impressions, is marked with rather prominent lines of growth, or striæ, parallel to the margin.

This species is rather common at Tullyconnel and Cultra. It also occurs in the Permians of Durham, and the neighbourhood of Manchester. Mr. Binney found "casts of Bakevellia"—probably the same species—along with "Schizodus, and other shells," in the magnesian limestone at Barrow Mouth, between St. Bees' Head and Whitehaven in Cumberland.* It is a characteristic fossil in Germany and Russia. Other four species are known to occur in the Permian system. The genus is also represented in the carboniferous and saliferous rocks; the so-called *Avicula socialis*, common in the Muschelkalk, is a Bakevellia.

6. Pleurophorus costatus = *Arca costata*, *Brown*.—Pl. i., figs. 5 a, b; Monograph, pl. xv., figs. 13, 20.

This shell is the type of an equivalved genus, first proposed in my Monograph, having some relation to Cardita. It is furnished with two diverging cardinal teeth in both valves, and one elongated posterior tooth in the right valve. The specimen represented under figure 5 a, is a cast of the right valve exhibiting the groove (a ridge in the cast) into which the posterior tooth of the right valve fitted; but it does not display so clearly the impressions of the cardinal teeth, which, however, are distinctly seen in one or two specimens before me. The anterior adductor muscular scar (in the present species deeply excavated) is bounded posteriorly by a ridge, the impression of which, as well as that of the muscular scar, are seen at * in the same figure.

Pleurophorus costatus is oval, and very inequilateral: it is generally ornamented with three or more ribs, running from the umbone to the posterio-ventral margins, and with a number of raised lines, running parallel with the free

---

* "On the Permian Beds of the North-west of England," vol. xii., Memoirs of the Literary and Philosophical Society of Manchester.

edge of the valves, as exhibited in the impression under figure 5 b, which is about twice the natural size.

This is not a rare species in the Tullyconnel limestone: it also occurs at Cultra, and in the neighbourhood of Manchester. In Durham, Germany, and Petchora-land, it is a characteristic Permian fossil. The genus belongs to the Carboniferous, Permian, Saliferous, and Jurassic Systems.

7. Schizodus Schlotheimi = *Cucullæa Schlotheimi, Geinitz.*—Pl. i., fig. 6; Monograph, pl. xv., figs. 31, (?) 32.

This species, which was first described from specimens occurring in the Zechstein of Germany, belongs to an extinct genus closely related to Bronn's Myophoria. Schizodus is equivalved, and possesses cardinal teeth arranged on the plan of those characteristic of Trigonia, but neither longitudinally grooved, nor so massive as in the last genus. It differs from Myophoria principally in the large tooth of the left valve being forked or bifurcated, like the corresponding tooth of Trigonia: in Bronn's genus this tooth is massive. Schizodus, I suspect, characterizes the Carboniferous, Permian, and Saliferous Systems. Myophoria appears to have had a longer geo-chronological range, since it occurs in Devonian strata and the three succeeding systems,—some of the so-called Cucullæas (or Dolabras, M'Coy) of the Marwood sandstone, (Upper Devonian) being of the genus. Goldfuss's *Megalodon truncatus*, which I am disposed to consider as closely related to, or even identical with, Sowerby's *Cucullæa angusta*, *C. unilateralis*, and *C. trapezium*, is, I strongly suspect, a species of Myophoria. The Marwood fossils, it is said, are inequivalved; but I suspect this is only apparent, arising from distortion or unequal compression.

Schizodus Schlotheimi is rather strongly inequilateral, a little tumid, rounded anteriorly, and somewhat tapering posteriorly, with an oblique truncation. All the specimens that have fallen into my hands are in the state of casts; I am therefore unable to speak of its external characters, except that the surface of the valves is nearly smooth, and marked on the anterior slope with a few faint wrinkles, impressions of which, owing to the thinness of the shell, are exhibited on the two specimens figured. An allied species, *Schizodus truncatus*, has occurred to me with marks of colouring still preserved—dark spots on a light ground, somewhat similar to the pattern exhibited on the recent *Circe Castrensis*.

This is the species which I strongly suspect has given rise to the identifications in Dr. Griffith's list under the names *Cucullæa unilateralis, C. complanata, C. trapezium*, and *C. Hardingii:* fossils thus named are also noticed in M'Coy's "Synopsis of the Carboniferous Fossils of Ireland," 1844, but without their localities being mentioned.* The only explanation I can give of these identifications is, that specimens of *Schizodus Schlotheimi* occur at Cultra so

* In Mr. Kelly's paper, previously referred to, these fossils are stated to be from Cultra.

variously distorted as to appear as if belonging to a number of species. I must not dispute, however, the possibility of there occurring in the locality named more species than one—perhaps the *Schizodus obscurus* of Sowerby.

Schizodus Schlotheimi is rather common both at Tullyconnel and Cultra. I am disposed to look on the Schizodus which Mr. Binney has found in the magnesian limestone between St. Bees' Head and Whitehaven as belonging to the present species.* It is abundant in the neighbourhood of Manchester, in Durham, and Germany. Other two or three species of the genus occur in strata of the Permian period.

8. Turbo helicinus = *Trochilites helicinus*, *Schlotheim.*—Pl. i., fig. 7; Monograph, pl. xvi., figs. 21–22.

This and the following Gastropods are only suspected as belonging to the genera in which they are respectively placed.

The present species, which rarely exceeds 3-8ths of an inch in height, has tumid whorls, marked with five or more rather prominent spiral ridges, crossed by numerous fine incremental lines. I found only two impressions in the Tullyconnel deposit, one of which supplied me with the gutta percha cast represented, thrice the natural size, under figure 7. It occurs near Manchester; also in Durham and Germany. *Turbo Mancuniensis*, an allied species, with a more elongated spire, appears to be absent at Tullyconnel, although it is a common Permian fossil in the neighbourhood of Manchester and in Durham.

9. Turbo Thomsonianus, *King.*—Pl. i.; fig. 8; Monograph, pl. xvi., figs. 23 and 24.

This is a pretty little species, hitherto only known to me as occurring near Sunderland, in Durham. It is smaller than the last, being seldom more than a quarter of an inch in height; and differs from it in being ornamented with numerous fine, thread-like spiral lines. The spire is elevated, resembling, in this respect, the *Turbo Mancuniensis*. Only a single good impression occurred to me, from which I have taken the gutta percha cast represented, thrice the natural size, in figure 8.

10. Turbo Taylorianus, *King.*—Pl. i., fig. 9; Monograph, pl. xvi., figs. 25, 26. This is another small species, ornamented like the last, but differing from it in having a shorter spire. The figure, a little above twice the natural size, is from a gutta percha impression taken from one of the best specimens I found at Tullyconnel, where it does not appear to be rare. It also occurs in the magnesian limestone near Sunderland, in Durham.

11. Rissoa (?) Altenburgensis = *Turbonilla Altenburgensis*, *Geinitz.*—Pl. i., fig. 10.

12. ——— (?) Gibsoni, *Brown.*—Pl. i., fig. 11.

In addition to the Turbos named, a few impressions of other two species of Gastropods occurred to me in the Tullyconnel limestone, but so small as to render the identifications above given somewhat doubtful. Both are smooth.

---

* Vide reference under *Bakevellia antiqua*.

The one identified with *Rissoa Altenburgensis* has the whorls more drawn out than in *R. Gibsoni;* and the latter has apparently more whorls than the former. In some respects they resemble my *Loxonema fasciata* and *L. Geinitziana*, both of which, however, are more elongated. Possibly the shell I have identified with Brown's *Rissoa Gibsoni* is the same as the *Trochus pusillus* of Geinitz. I observed similar shells in Mr. M'Adam's collection of Cultra magnesian limestone fossils. "Some obscure univalves" are noticed in Dr. Griffith's list. *Rissoa Gibsoni* occurs near Manchester, and *R. Altenburgensis* in Germany.

13. CYTHERE ? INORNATA, *M'Coy.*—Pl. i., fig. 13; Monograph, pl. xviii., fig. 9.

Only two distinct specimens of an Entomostracan have been found at Tullyconnel; they are not exactly alike in outline, but sufficiently so to be regarded, for the present, as belonging to one species, which is somewhat between the carboniferous *Cythere inornata* of M'Coy, and the Permian *C. Geinitziana* of Jones. As a Permian fossil, the present species occurs on the coast of Durham.

There are thus thirteen species occurring in the Tullyconnel Magnesian Limestone, all of which are true Permian forms. Furthermore, the deposit is chemically and lithologically the same as much of the Magnesian Limestone in the county of Durham, and in Germany. The same may be said of the Cultra "fossiliferous dolomite." It necessarily follows, then, that the existence of the Permian system in Ireland, is placed beyond all doubt.

The question next arises as to which of the Permian subdivisions the Tullyconnel and Cultra dolomite belongs.

In my Monograph* I published the following Comparative Table of the constituent members of the German and the North of England Permian System:—

MEMBERS OF THE PERMIAN SYSTEM IN GERMANY.	MEMBERS OF THE PERMIAN SYSTEM IN THE NORTH OF ENGLAND.
1. Stinkstein.	1. Crystalline and non-crystalline limestone.†
2. Rauchwacke.	2. Brecciated and pseudo-brecciated limestone.‡
3. Dolomit, or Zechstein Dolomit.	3. Fossiliferous limestone.
4. Zechstein.	4. Compact limestone.
5. Mergel-schiefer.	5. Marl slate.
6. Todte-liegende.	6. Inferior or Lower New Red Sandstone.

* Introduction, p. xvii.

† There occur in Yorkshire and the adjacent counties beds of marl and gypsum which may belong to No. 1, or they may prove a still higher member.

‡ In the second or brecciated member I have only found fossils which appear to have been washed out of the third or "fossiliferous limestone" member.

For present purposes it is unnecessary for me to refer to any but the first and third members. Both are distinguished from each other by palæontological differences. The first member is characterized in the north of England only by a few species of fossils, such as *Mytilus squamosus*, *M. septifer*, *Leda Vinti*, *Pleurophorus costatus*, *Schizodus Schlotheimi*, *Cythere inornata*; whereas the third contains about 143 species (including most of those just named), many of which are bryozoic corals and palliobranchiate shells. The first member is extensively developed on the coast of Durham, the shore cliffs between Hartlepool and South Shields being principally composed of it. In some localities it is highly crystalline, varying extremely in structure; but in most places it is earthy, oolitic, cellular or compact, of a yellowish or brownish colour, and highly charged with carbonate of magnesia. The late Professor A. Johnstone has published the following analysis of the oolitic variety, which is very abundant around Hartlepool:—

Carbonate of lime, ...	54·5.
Carbonate of magnesia, ...	44·93.
Alumina, iron, and phosphoric acid, . .	0·33.
Insoluble matter, ...	0·24.

I have given this analysis of the magnesian limestone of Cultra, because it closely corresponds with one published by Sir Robert Kane.* Mr. M'Adam has kindly furnished me with another of the Tullyconnel limestone made by Dr. Hodges, of Queen's College, Belfast, showing that it too has a very similar chemical composition. Thus, in its lithological and chemical characters, the first member, as it occurs in Durham, offers a remarkably close agreement with the Tullyconnel and Cultra magnesian limestones: further, both possess a palæontological resemblance, which is equally remarkable; for in the Tullyconnel and Cultra beds there is very nearly the same assemblage of fossils as occurs in the upper Permians on the coast of Durham.† This being the case, I cannot refrain from

* Industrial Resources of Ireland, page 246.

† Mr. Bryce states in his "Geological Notice on the Environs of Belfast," &c., that Terebratulæ and Productæ occur in the Cultra magnesian limestone. There is, probably, an error in this statement, as I certainly saw none of these fossils in Mr. M'Adam's collection; nor is Mr. M'Adam himself acquainted with any; nor are there any noticed in Dr. Griffith's list.

drawing the conclusion, that the Irish "fossiliferous dolomite" belongs to the highest member of the Permian system, as developed in the north of England.

There are some intermediate localities, the geology of which is somewhat confirmatory of the view just advanced. At Collyhurst and some other places near Manchester, there occur some Permian beds, which, although not dolomitic, contain an exactly similar group of fossils as characterizes the upper members in Durham; and I am led to think, that they occupy a high position in the System. At Barrow Mouth, between St. Bees' Head and Whitehaven, in Cumberland, there is a bed of magnesian limestone of a cream colour, 10 ft. 6 in. in thickness, similar to that at Cultra, overlying the coal-measures, and underlying the New Red Sandstone. Fossils are extremely rare in this deposit; but it has yielded Mr. Binney "casts of Bakevellia, Schizodus, and other shells."*

The parallelism which has just been made out between the Irish Permians and the uppermost members of the system in the north of England, I am strongly inclined to believe, may be extended into Germany; for I have elsewhere† pointed out certain evidences tending to prove that the uppermost Permian only (Stinkstein and Rauchwacke) in the Thuringerwald are marked by the presence of a few bivalves, and by the general absence of Bryozoons and Palliobranchs.

In conclusion, the discovery of Permian beds in Ireland is of considerable geological interest; and it may eventuate in vast industrial benefits. In England almost every stratigraphical group or "system" occurring in central and northern Europe has been found; but in Ireland one interesting link in the chain is generally considered as being absent—the Permian System: this link, however, is now supplied. Further, in many parts of Tyrone and the adjoining counties, there are beds whose relative position has long been looked on as doubtful; but the presence of a well-known Permian rock at Tullyconnel is highly calculated to settle their exact geological age. With reference to its industrial importance, there are several districts in the province of Ulster whose surface rock is a freestone, generally supposed to be the "New Red Sandstone,"—a formation so

* Binney "On the Permian Beds of the North-West of England."

† Monograph, "Introduction," pp. xvi. xvii.

geologically high above the coal-measures as to render, in many cases, the sinking of a colliery shaft through it a ruinous speculation. Should, however, the so-called "New Red Sandstone" turn out to be the Rothe-todte-liegende, or Lower New Red, as I suspect will be the case with that in the south of Tyrone and the adjacent part of Armagh, no expense ought to be spared in boring through it, with the view of reaching workable beds of coal, similar to those of Coal Island, at no great depth below the surface; and there ought to be no delay whatever in ascertaining their existence below the Permian limestone of Tullyconnel.

DESCRIPTION OF PLATE I.

Fig. 1 a. *Favosites Mackrothii.* Natural size.
,, – b. Another specimen, magnified.
,, 2. *Thamniscus dubius.* Twice the natural size.
,, 3 a. *Mytilus squamosus.* Twice the natural size. Cast showing impressions of the pallial line, and the posterior adductor muscle.
,, – b. Another specimen, a cast. Twice the natural size.
,, 4 a. *Bakevellia antiqua.* Natural size. Cast.
,, – b. Another specimen. Cast, enlarged, showing impressions of the teeth, cartilage pits, and adductor muscles.
,, – c. Another specimen. Twice the natural size, showing impressions of the pallial line, adductor and other muscles.
,, – d. Another specimen. Natural size.
,, 5 a. *Pleurophorus costatus.* Cast, somewhat enlarged, showing impressions of the posterior tooth, the anterior adductor muscle, and the ridge behind the latter.
,, – b. Another specimen. Impression of, twice the natural size, showing the ribs emanating from the umbone.
,, 6. *Schizodus Schlotheimi.* Casts, natural size. This is one of the specimens collected by the assistants under Col. Portlock.
,, 7. *Turbo helicinus.* Thrice the natural size.
,, 8. —— *Thomsonianus.* Thrice the natural size.
,, 9. —— *Taylorianus.* A little above twice the natural size.
,, 10. *Rissoa* (?) *Altenburgensis.* } Thrice the natural size.
,, 11. —— (?) *Gibsoni.* }
,, 12 a. *Spirillina pusilla.* } × about 12 diameters.
,, — b. —— —— }
,, 13 a. *Cythere* (?) *inornata.* }
,, — b. —— —— } × about 8 diameters. The specimen under figure *a* has a corner broken off.
,, — c. —— —— }

All the specimens represented in the plate, with the exception of the Spirillina and Cythere, are placed in the palæontological collection of the Museum of Irish Industry, mounted and named.

ANNUAL ADDRESS

DELIVERED BEFORE THE

GEOLOGICAL SOCIETY OF DUBLIN,

FEBRUARY 13, 1856,

BY

LORD TALBOT DE MALAHIDE,

PRESIDENT OF THE SOCIETY.

GENTLEMEN,—I feel considerable diffidence in addressing you on this, the twenty-fifth anniversary of the formation of the Society, fully aware of my own deficiencies, and of the high character and scientific distinction which my predecessors have justly earned for themselves by their labours in the field of Geology, and the valuable contributions they have added to the stores of geological literature. Moreover, from a pressure of circumstances during the past year, I had been particularly trammelled with engagements such as precluded me from following up very closely this interesting science. I have long been much interested in its progress; and although I have not had many opportunities of investigating the different sections of the country, it would argue a very uninquiring or apathetic mind, when once initiated into its mysteries, however superficially, not to have taken some pains to ascertain the new phases which Geology is assuming, the theories which have stood the test of time and discussion, as well as the great advance which the united labours of the mineralogist, the palæontologist, the chemist, and the mathematician, have contributed to produce of late years. I feel most proud of having been called on at such a time to preside over you; and, although our numbers are comparatively few and our papers not very frequent, I have the highest authority for stating that the London Geological Society—which may be

called the parent of all such societies—is already proud of the zeal and achievements of some of our members.

The Report of the Council having entered into statistical details, I shall not dwell much on the proceedings of the past year. I may, however, be permitted to congratulate you on the very important and interesting paper read by my learned predecessor and Mr. Salter on the line of demarcation between the Carboniferous and Devonian rocks in the south of Ireland. This is a most important and interesting subject; and without expressing any opinion upon this controversy, I am sure you will join with me in the wish that we may have such further detailed information as may set this point at rest. Our worthy Vice-President, Dr. Griffith, has entered into the field, and I trust that he will continue to favour us with his extended researches. There are at the present moment several similar controversies afloat, such as the distinction between the Cambrian and Lower Silurian rocks, between the Eocene and Cretaceous formations; and, indeed, as might naturally be expected, the gradual progress of the science, and the minute investigation which is being extended to all the strata of the earth, show the extreme difficulty of drawing abrupt lines of distinction on palæontological grounds. Mr. Du Noyer has given us a very interesting communication on the neighbourhood of Killarney; and Professor King, of Queen's College, Galway, has given us a most important paper on the deposits of Artrea in the county of Tyrone, which he demonstrates to belong to the Permian period, instead of the New Red Sandstone. This discovery may lead to the most important results with reference to the working of our coal mines. We have also had some most valuable papers on the composition of the Irish granites. Every one who has heard the Rev. Samuel Haughton's contributions must be aware of the great accuracy of his investigations; and I understand that he has obtained most original mineralogical data for classifying by eye the different granitic rocks. The Rev. Professor Galbraith has also been a most assiduous labourer in this field. And here I hope that I am not travelling beyond my province in alluding briefly to the controversy in which this gentleman has engaged with reference to the existence of porcelain clay in Ireland. No one can be better qualified than he is to express an opinion of the quality of the Irish clay, or of its fitness for the production of those beautifal wares, which have added so much lustre to the ma-

nufacturing reputation of Staffordshire, and so much wealth to its inhabitants. We must also look to him, and such philosophers, to dispel erroneous views which may lead to popular delusions and rash speculations. However, I am myself deeply impressed with the importance of advancing by every means in our power the industrial wealth of Ireland; and we must consider that if our country does not contain within itself all the ingredients for the manufacture of porcelain, it is well known that neither in Staffordshire nor Worcestershire are to be found any of the raw materials used in its manufacture, unless coal is to be included in this term. With the great extent of granitic and quartz rock in Ireland, there is nothing improbable in the discovery of kaolin and silex fitted for manufacture, and if the kaolin is in an impure state, it is well worth the pains of experimental philosophers to ascertain whether there is not some easy process of purifying it from the iron and other deleterious ingredients which it may contain. Far, however, be it from me to urge the establishment of manufactures of this kind on the loose data that have been brought forward, as I am convinced that without due energy and perseverance no enterprise can succeed, and that with these valuable assistants there is no country which is not able to place itself in an advantageous position in the markets of the world.

Another interesting subject is the Drift of Ireland. As Professor Jukes has well observed, it has not been treated with the attention it deserved. Mr. Thomas Stanly has, however, read a paper on the subject; and I trust that Mr. Kelly has not abandoned a subject into which he has inquired with his usual accuracy and discrimination. We also owe to Mr. Kelly a very voluminous catalogue of fossils of the Irish Carboniferous Limestone. One of the characteristic features of geological literature is the disposition to divide the labour of observation into monographs, and no system is more likely to enable us to place Geology nearly on the footing of an exact science.

It may appear great presumption on my part to attempt anything like a review of the general state of Geology at the present moment, and therefore I shall not attempt any such thing;—but I cannot deny myself the gratification of congratulating you on the great addition we have received during the past year to the information we previously possessed of the physical structure of the globe.

Even a cursory reader could not fail being struck, even a very few years since, with the very great blanks which prevailed in the geology of countries that ought to have been by this time tolerably well known. One great blank has been, in a great measure, removed by the wonderful map of India by Mr. Greenough—the Nestor of Geology; he will transmit his name to future ages by two maps, which contained at the time of their publication an enormous amount of information for any single private individual to have compared and digested. The Geological Survey, under the auspices of the East India Company, will of course supply exact information on those points, not only of the greatest value in a scientific point of view, but of great use to every industrial undertaking, whether it be mining or agricultural; whether it be to make roads, or to convey water from a damp to a thirsty soil. The rapid extension of those geological surveys is probably the most characteristic feature of the day. Not only France and Germany have nearly completed this work, but our Transatlantic brethren have made great efforts, and are still doing so, to promote the many capabilities of their enormous territory. Isbister's Essay on the Geology of North America, published in the English Geological Journal, contains a vast amount of information on those inhospitable latitudes, which have been traversed by so many expeditions, and in which, alas, many a hero has fallen a martyr to his duty and his love of science! It is very gratifying to find Mr. Sharpe investigating, with his usual accuracy, the interesting provinces of Portugal; and some precise information about Spain is very much required. It is true that Capt. Widdrington several years ago, in his interesting Tour, described many of its more peculiar features. Mr. Pratt and the gentlemen connected with the Asturian mines have also given us some occasional glimpses into the interior of the crust of that rich land. Dr. Daubeny also gave an interesting description of his search after the Apatite mines of Estremadura. There has also been a great accession to our knowledge of the geology of South Africa. Captains Gordon and Sutherland have identified and described the cretaceous strata of Port Natal. However, probably the most original and curious fragment of extra-European geology is Mr. Loftus's account of the mountain ranges extending on each side of the boundary between Turkey and Persia. He has made a noble use of his opportunities when connected with the Mixed Boundary Commission; and it is very much to be wished

that a detailed and well-illustrated report should be published under the Government supervision as to that district. The great impetus which the gold discoveries have given to the physical exploration of Australia still continues to produce the most valuable results. Mr. Clarke, Selwyn, and others, are constantly adding to our knowledge of the formations of that continent, and it will surprise every inquirer who a few years since would have been dependent on the superficial inquiries of Mitchell, Streletzki, and the hurried notes of our late worthy President, to find the number of well qualified labourers in this field. The French Government has generally been successful in combining the objects of war and science, and few of their expeditions into wild countries during the last thirty years have been unaccompanied with a scientific and artistic staff. To them we owe the valuable reports on Egypt, the Morea, Algeria; and I have no doubt that, at the conclusion of this war with Russia, there will appear, at the expense of the French Government, some important contributions to the natural history of Turkey and the Crimea, if not of the Baltic. If the additions to the range of our inquiries are satisfactory, it is equally satisfactory to find that we are rapidly obtaining a much more accurate knowledge of those productions, with which we flattered ourselves we were tolerably well acquainted. How invaluable the researches going on under the care of the gentlemen of the Ordnance Geological Survey in the Silurian and Cambrian rocks! It is to be hoped that they will be rewarded with the discovery in Great Britain of the unique protozoic fossil, the Oldhamia. In an equally interesting field, Mr. Prestwich has made discoveries startling and original. The London clay may be said to have been the first and most minutely explored of English fossiliferous beds, and yet it remained for Mr. Prestwich to place them in their proper position, and to find equivalents for one of the Parisian beds which had escaped the most accurate observers.

The great English geologists do not appear by any means to be resting on their oars, or to trust to their past acquired name for maintaining their proper position in the geological world. Sir Roderick Murchison, ever bent on extending and correcting his former observations, has published a most interesting Report on the Geology of the North of Germany. We cannot be too grateful to him for his giving us the true place of the Nummulite beds. Mr. Hamilton, the learned President of the Geological Society, is indefatigable in

working out the Rhenish formations. The Rev. Professor Sedgwick has not relinquished his hold of the lower Silurian deposits; and Sir Charles Lyell, who supports his beautiful theory with such an array of information, and such a clearness of expression, that one cannot avoid yielding one's assent to them, has produced a detailed account of the island of Madeira. It may not, perhaps, be out of place here to make a few observations on those important practical subjects on which our members can throw the light of their talent and their industry. Every scientific inquiry is, doubtless, practically useful; and although many sciences may not appear likely ever to lead to positive results, experience has proved otherwise. The great value of Conchology is a striking proof of this assertion. I need not allude to the importance of the fullest information being supplied to us relative to mines, to coal, or to salt. The different mineral raw materials scattered through the country—our beautiful marbles, which are at present so inefficiently worked—the different questions relating to the connexion between Agriculture and Geology—all should engage our close attention. I may also invite your particular attention to the question of the bogs. Monographs of these made by competent persons would, in my opinion, be of the greatest practical importance, and there are many theoretical questions connected with them which have not obtained the attention which they deserve. From a very partial observation, I cannot resist the conclusion that a great portion of the surface now covered with peat is of recent formation, and it would be most important, in the absence of topographical and historical information, to obtain geological data, so as to settle this subject. No gentleman could be more competent to deal with it than Professor Allman, who combines such an amount of zoological and botanical knowledge with Geology. He has been obliged to resign his place on the Council from the pressure of his new duties, and we must feel proud of one of our alumni being placed in the high position of successor to Professor Forbes. With my friend Professor Jukes, I have had the painful task to mourn over his loss. He conferred great benefits on the Irish Geological Survey, and it will be long before we see his equal in Palæontology.

This year has also been signalized by the loss of Sir H. de la Beche, the head of the Geological Survey. He was a member of this Society, and anxious for its success. It is hard to speak in sufficiently high terms of the obligations which we owe him. He may not have

possessed the genius, the acquirements, the eloquence of a Sedgwick, a Buckland, a Murchison, or a Lyell; he may not have had the same gift of clothing the most abstruse questions in clear and intelligible language: but to none does our science owe more. He was one of the earliest cultivators of it, one of the most industrious observers, a good mineralogist, and the founder of the Ordnance Geological Survey and the Museum of Practical Geology and the School of Mines. He was also a most constant contributor to the Transactions of the Geological Society. His "Geological Manual," and "How to Observe in Geology," have long been considered as standard works; and one of his earliest and least known productions, "Researches in Theoretical Geology," is remarkable for some very interesting views of the probable mode of formation of our planet. His loss will be long and deeply felt; but a more efficient and fit successor could not be found than Sir Roderick Murchison, and under his auspices I have no doubt that in a few years' time all our geological questions will have been so far elaborated, that it will indeed be a difficult task to make any important discoveries in it, except by resorting to the aid of that great discoverer of unknown worlds—the microscope—by means of which Ehrenberg has extended to such an extraordinary degree the domain of nature, and enlarged our views of the power and intelligence of the Supreme Being and Creator of the universe.

AT THE

ANNUAL GENERAL MEETING

HELD ON

WEDNESDAY, FEBRUARY 13th, 1856,

GILBERT SANDERS, ESQ.,

IN THE CHAIR,

The following Report from the Council was read and adopted:

Your Council offers the usual list of the Members actually belonging to the Society, from which it appears that the effective strength of the Society consists at present of 165 Members.

Honorary Members, ...	5
Corresponding Members, ...	4
Life Members, ...	43
Annual Members, ...	82
Associates, ...	31
Total, ...	165

In the first Appendix to this Report, a statement of the total Members gained and lost during the year is given, from which it appears, that we have gained nine new Members to our list during that period.

The following view of the progress of the Society, for the past ten years, is submitted to your attention, as it appears to your Council to afford an encouraging prospect of our future success; as the Journal of the Society proves that the additional Members gained by us from year to year have been not merely additions to our numbers, but also useful additions to our stock of working geologists:—

Number of Members for Ten preceding years.

In 1846	84 Members	In 1852	132 Members.
„ 1847	91 „	„ 1853	142 „
„ 1848	97 „	„ 1854	146 „
„ 1849	100 „	„ 1855	156 „
„ 1850	110 „	„ 1856	165 „
„ 1851	123 „		

During the past year the papers read before the Society have been unusually interesting, and some of them likely, from their practical bearing, to possess an interest for many who are not as yet Members of our Society. It is hoped by your Council that the increased circulation likely to be obtained by our publications, in consequence of the recent arrangement with the Editors of the Natural History Review, will attract the notice of some who may wish to join the Society; and that our labours, becoming better known, will be better appreciated than they have yet been by many whose interests are intimately connected with the progress of Geological Science.

The first number of the Natural History Review, which contains the Journal of the Geological Society of Dublin, has been already delivered to each Member of the Society not in arrear of subscriptions; and it is hoped that a similar number of this Review, containing papers read before your Society, will be placed each quarter in the hands of all our Members, who will thus receive the publications of the Society four times per annum, instead of, as hitherto, only once; and that too at an uncertain interval.

Let each Member of the Society make his friends acquainted with the advantages to be obtained by joining us; and let us endeavour to increase the number of our Subscribers to an extent which will place us in a position, which, in a financial point of view, will be suitable to the important objects the Geological Society of Dublin has kept steadily in view for the quarter of a century during which it has lived and thriven.

Your Council also desire in this Report to acknowledge the liberality of the Board of Trinity College, by which they have been enabled to make some valuable additions to the list of their publications.

In the Appendix following the Report will be found the statement of our accounts for the past year, from which it appears that there was a balance of £28 13*s.* 5*d.* to the credit of the Society on January 1, 1856.

APPENDIX TO ANNUAL REPORT.

No. I.

MEMBERS ADDED.

Honorary Corresponding Members.

John S. Kennedy, Esq.
Henry B. Medlicott, Esq.

Life Members.

Sampson Carter, Esq., C. E.

Annual Members.

Griffin Byrne, Esq.
Edward S. Clarke, M.D.
Lord De Vesci.
J. W. Kavanagh, Esq.
Thomas W. Kingsmill, Esq.
John Lloyd, Esq., C. E.
Dominick M'Causland, Esq.
Hamilton Willis, Esq.

Associates.

Robert Barton, Esq.
W. B. Brownrigg, Esq.
Henry D. Crozier, Esq.
John W. Fisher, Esq.
Jacob Henry Geoghegan, Esq.
Robert Gwynne, Esq.
W. E. Hamilton, Esq.
Francis Hewson, Esq.
John Hime, Esq.
Alexander Johnson, Esq.
D. A. M'Cready, Esq.
John Nolan, Esq.
John Richardson, Esq.
Richard W. Stewart, Esq.
Arthur G. Waller, Esq.

LOST FROM DEATH AND OTHER CAUSES.

Life Members.

Sir Henry T. De La Beche.

Annual Members.

Hans W. Allen, Esq.
Professor Allman, M. D.
Halliday Bruce, Esq.
William W. Campbell, Esq.
Emerson Dawson, Esq.
Henry English, Esq., C. E.
James H. Hamilton, Esq., M.P.
John S. Kennedy, Esq.
John Lloyd, Esq., C. E.
Henry B. Medlicott, Esq.
Luke White, Esq.
Richard Wolseley, Esq.

Associates.

Arthur Jacob, Jun., Esq.
Joshua H. Lamprey, Esq.
Thomas M'Comas, Esq.
William Smith, Esq.

Total added, ...	26
Total lost, ...	17
Gained, ...	9

PRESENT STATE OF SOCIETY.

Honorary Members,	5
Corresponding Members,	4
Life Members,	43
Annual Members,	82
Associates,	31
	165

In February, 1855,	156 Members.
In February, 1856,	165 ,,
Gained,	9 Members.

No. II.

DONATIONS SINCE FEBRUARY, 1855.

1855.

Feb. 16.—Proceedings of the Royal Irish Academy, Vol. VI., Part 1. Presented by the Academy.

Mar. 3.—Rejoinder to Professor Milne-Edwards and Mr. Bowerbank. On the May Hill Sandstone, and the Palæozoic System of England. By the Rev. Professor Adam Sedgwick, F. R. S., F. G. S. Presented by the Author.

Mar. 14.—A Fossil "Bone." Presented by Edward Fitzgerald, Esq., Youghal.

Mar. 28.—Proceedings of the Linnean Society, Nos. 42 to 58; with a List of the Society, 1854. Presented by the Society.

April 4.—The Mining Journal, Nos. 1019, 1022, and 1023. Presented by the Editor.

April 30.—Selections from the Records of the Bengal Government, Nos. 6, 8, and 13 (1852-3). A Geological Report on the Kymore Mountains, the Ramghur Coal Fields, and on the Manufacture of Iron, &c. By D. H. Williams, Esq. A Geological Report on the Damoodah Valley. By D. H. Williams, Esq. Presented by Thomas Oldham, Esq., F. R. S.

April 30.—Proceedings of the Zoological Society of London, Nos. 201 to 257. Presented by the Society.

June 6.—The Natural History Review, Nos. 5 and 6. Presented by the Dublin University Zoological Association.

June 13.—The Mining Journal, No. 1029. Presented by the Editor.

June 13.—Proceedings of the Linnean Society, Nos. 59 and 60. Presented by the Society.

June 20.—Abstracts from the Meteorological Observations taken at the Stations of the Royal Engineers in the year 1853–4. Presented by Lieut.-Col. James, R. E.

June 29.—Transactions of the Kilkenny Archæological Society, for the year 1853. Presented by the Society.

July 10.—On an Analysis of the Potash and Soda Felspars of one of the Dublin Mountains. By Francis M. Jennings, M. R. I. A., F. G. S. Presented by the Author.

Sept. 24.—Proceedings of the Liverpool Literary and Philosophical Society, No. 9. Presented by the Society.

Oct. 3.—On the Permian Beds of the North-west of England. By Edward W. Binney, F. G. S. Presented by the Author.

Oct. 15.—The American Journal of Science and Arts. Second Series, No. 59, Sept., 1855. Presented by the Editors.

Oct. 20.—A Memoir on the Extinct Sloth Tribe of North America. By Joseph Leidy, M. D. Publications of Learned Societies and Periodicals in the Library of the Smithsonian Institution, Part I. Eighth and Ninth Annual Reports of the Board of Regents of the Smithsonian Institution, 1853–4. Presented by the Smithsonian Institution.

Oct. 20.—Report on the Agriculture and Geology of Mississippi; embracing a Sketch of the Social and Natural History of the State. By B. L. C. Wailes. Presented by the Author.

Oct. 20.—Proceedings of the Boston Society of Natural History, Vol. IV., Nos. 25, 26; Vol. V., Nos. 1 to 11. Presented by the Society.

Oct. 20.—Proceedings of the New Orleans Academy of Sciences, Vol. I., No. 1; with the Constitution and By-Laws of the Academy. Presented by the Academy.

Oct. 25.—Introductory Lecture on Geology; delivered by H. B. Medlicott, A. B. and C. E., T. C. D., Professor of Geology, to the Students of the Thomason Civil Engineering College, Roorkee, on the 15th May, 1855. Presented by the Author.

Oct. 27.—Abstracts of the Proceedings of the Ashmolean Society, Vols. I., II. and Nos. 31 and 32. Presented by the Society.

Oct. 31.—Address to the Royal Geographical Society of London; delivered at the Anniversary Meeting on the 28th May, 1855. By the Right Hon. the Earl of Ellesmere, K. G., D. C. L., &c., President. Presented by the Society.

Nov. 5.—Transactions of the Royal Scottish Society of Arts, Vol. IV., Part 3. Presented by the Society.

Nov. 10.—Tours in Ulster: a Hand-book to the Antiquities and Scenery of the North of Ireland. By J. B. Doyle. Presented by the Author.

Nov. 14.—The Natural History Review, Vol. II. Presented by the Editors.

Nov. 14.—A Geological Map of India. By W. Greenough. Presented by the Executors.

Nov. 14.—A Geological Map of Wisconsin. By I. A. Lapham. Presented by the Compiler.

Nov. 26.—On the Cleavage of the Devonians of the South-west of Ireland. By Robert Harkness, F. R. S. E., F. G. S., and John Blyth, M. D. Presented by the Authors.

Nov. 26.—On the Geology of the Dingle Promontory. By Robert Harkness, F. R. S. E., F. G. S. Presented by the Author.

Dec. 19.—Description Géologique du Département de la Seine-Inférieure. With Atlas. Par M. Antoine Passy. 4to. Rouen, 1832. 2 vols. Presented by the President.

Dec. 19.—The American Journal of Science and Arts, No. 60. Presented by the Editors.

Dec. 21.—Historic Society of Lancashire and Cheshire.—Proceedings and Papers, Vols. I. to VI., and "Transactions," Vol. VII. Presented by the Society.

1856.

Jan. 2.—Quarterly Journal of the Geological Society of London, Nos. 41 to 43. Presented by the Society.

Jan. 2.—Journal of the Royal Geographical Society of London, Vol. XXIV. With a Paper on the Origin, Objects, and Progress of the Society. Presented by the Society.

Feb. 13.—Proceedings and Transactions of the Kilkenny and South-east of Ireland Archæological Society, for the year 1855, Vol. III., Part 2. Presented by the Society.

Feb. 13.—The Athenæum, 1855. Presented by the Editor.

Feb. 13.—The Literary Gazette, 1855. Presented by the Editor.

Feb. 13.—Journal of the Society of Arts, Nos. 117 to 168. Presented by the Society.

Feb. 13.—The Irish Reporter, Nos. 1 and 2. Presented by the Editor.

No. III.

ABSTRACT OF THE TREASURER'S ACCOUNT FOR THE YEAR 1855.

Dr.

1855.	£	s.	d.
To Balance from last year,	22	0	11
— Three Half-years' Dividends in the Funds,	5	8	11
— Sale of Journals,	3	0	0
— Admission Fees,	9	0	0
— Annual Subscriptions, 60 10 0			
— Do. do. from the Accounts of late Treasurer, 3 0 0			
	63	10	0
	£102	19	10

Cr.

1855.			£	s.	d.
By One Half-year's Salary to Assistant Secretary,	10	0	0		
— Gratuity to Attendant, (per Draft 5137)	1	10	0	11	10	0
— Cash returned to Professor Harkness, overpaid on Life Subscription (Draft 5139),			5	0	0
— Mr. Gill's Account for Printing,	3	11	0		
— Mr. Oldham's do. for Engraving, (per Draft 5140),	11	19	6	15	10	6
— Incidentals per Assistant Secretary (Draft 5141),				11	15	7
— One Half-year's Salary to Assistant Secretary, (per Draft 5142),				10	0	0
— Mr. Oldham's Account for Engraving,	3	15	0		
— Mr. Tallon, for Stationery,	1	4	0		
— Incidentals, per Assistant Secretary, (per Draft 5143),	6	10	4	11	9	4
— Incidentals, per Assistant Secretary,	5	11	9		
— Collector's Commission, (per Draft 5144),	3	9	3	9	1	0
				74	6	5
Balance,				28	13	5
				£102	19	10

The Report having been read and adopted, the Ballot was closed, and the following Officers and Council declared duly and unanimously elected.

President:

LORD TALBOT DE MALAHIDE.

Vice-Presidents:

JAMES APJOHN, M. D.
PROFESSOR HARVEY, M. D.
JOSEPH BEETE JUKES, M. A.
REV. HUMPHREY LLOYD, D. D.
RICHARD GRIFFITH, LL. D.

Treasurers:

SAMUEL DOWNING, C. E.
GILBERT SANDERS, ESQ.

Secretaries:

REV. PROFESSOR HAUGHTON, F. T. C. D.
FREDERICK J. SIDNEY, LL. D.

Council:

ROBERT BALL, LL. D.
JOHN MACDONNELL, M. D.
ROBERT CALLWELL, ESQ.
ROBERT MALLET, C. E.
REV. J. A. GALBRAITH, F. T. C. D.
JOHN KELLY, ESQ.
GEORGE M'DOWELL, F. T. C. D.
EDWARD WRIGHT, LL. D.
RICHARD PURDY ALLEN, ESQ.
REV. GEORGE LONGFIELD, F. T. C. D.
SAMUEL GORDON, M. D.
JOHN B. DOYLE, ESQ.
THOMAS HUTTON, ESQ.
DOMINICK M'CAUSLAND, M. A.
WALTER S. WILLSON, ESQ.

THE Society met on the 9th of January, 1856, on which occasion the following Paper was read.

ON THE GEOLOGY OF THE LAKE DISTRICT OF KILLARNEY.

BY MR. GEO. V. DU NOYER.

THE district to be described comprises in superficial extent an area of about 100 square miles, inclusive of the Lakes; and is marked on the Ordnance Survey Index of the county of Kerry as sheets 65; southern half, 66, 73, 74; and the northern halves of 83, 84. It will be seen, therefore, that Carrantwohill Mount, Macgillicuddy's Reeks, and the Black Valley, the Range of Knocknabreda, with Cromagloun and Torc Mountains, the rocky ridge terminating in the Eagle's Nest, Cliff, Mangerton, and the Devil's Punch-bowl, are included in this area.

As he proposed noticing the rocks in descending order, he had first to speak of

THE COAL-MEASURES.

These occupy but a small portion of the district, and constitute its northern boundary, forming the low ridge of ground on which the old church of Aghadoe stands. They consist of thick beds of dark gray, splintery shale, often almost black, and sometimes presenting a concretionary structure. Through these shales are thick and thin bands, and often sets of beds of hard gray and olive gray grits, in the thinner layers of which, impressions of coal plants are not uncommon. The only point of present geological interest connected with these coal-measures is the fact, that wherever they can be well observed along their southern boundary, they invariably dip to the south from 30° to 65°,—thus appearing to underlie the Carboniferous Limestones. As this discrepancy in the dip is persistent for many miles from the west of Killarney to Mallow, a distance of fully 50 miles, it can only be accounted for by supposing either a fault, or an inversion of the beds by contortion.

CARBONIFEROUS LIMESTONES.

In Muckross Demesne occurs the most perfect development of the Carboniferous Limestones of the Killarney district. The uppermost beds there, or those which occur in the eastern portion of the Demesne, are all of a light gray colour, close-grained and finely laminated,—a structure apparently in many instances due to cleavage;

but where the bedding is at all discernible, it dips southward from 35° to 40°; where the cleavage prevails, its inclination and strike coincide with those of the beds. Fossils are sparingly scattered through these limestones, and consist chiefly of crinoid fragments. As we proceed westward, dark gray chert sometimes occurs in irregular and thin lumpy layers, but generally the rock is homogeneous in character. Below the beds just described are others which are finely crystalline, with numerous hard, irregular, semi-calcareous layers, weathering out like chert. These siliceous beds are well seen on the western shore of Dundag Bay, close to Muckross Abbey, the seat of Colonel Arthur Herbert; they also dip southward at 60° to 70°, and may probably be about 200 feet in thickness. The same beds cross the entrance to Kilbeg Bay; and close to the Devil's Island they are contorted in such a manner as to indicate the presence of a fault, which he named the Doo Lough fault.

Immediately below these siliceous beds, light gray laminated limestones again occur, similar in character to those first described, and traceable along the shore of Mine Paddock Bay still farther to the west, dipping south at 40°, and presenting a thickness of about 300 feet.

At the northern extremity of Mine Paddock Bay a remarkable set of beds are now observed. These are best seen at the "Marble Quarries" west of the bay, and consist, first, of thin lenticular layers of white, pink, and greenish compact marble, with numerous irregular laminæ of green and purple argillaceous shale, not calcareous. Second, light-gray compact marble, in very thin layers, with light green argillaceous shale partings, the average dip of all being southwards at 30°, with a thickness of about 50 feet. These beds are totally devoid of fossils. Below these marble layers the limestone becomes gray and finely crystalline, with chert layers arranged closely together. As we descend in the series, the chert dies out; and along the shore east of the old copper mine the limestone becomes decidedly crystalline and fossiliferous, rather regularly bedded, and the chert occurs sparingly in nodules. About 500 feet west of the beds last described, the old copper mine occurs; it appears as occupying a break in the limestones, striking E. N. E. from the shore, where it is filled with decomposed iron pyrites. Fragments of copper pyrites lie scattered about, and many of these, when broken, exhibit strings of galena. West of the lode the limestones become thin-

bedded, dark gray, finely crystalline, and occasionally compact with crinoid fragments and other fossils; and these beds rapidly graduate down into the Carboniferous Slate, as we proceed still further to the west.

If therefore we take the thickness of the limestone, from the top of the first siliceous beds observed at Dundag Bay to the top of the Carboniferous Slates, we have a total amount of 800 feet; this does not include the upper beds to the east in Muckross Demesne, the thickness of which is nowhere ascertainable. At the entrance to Coolough Bay, west of the copper mine, the Carboniferous Slates are well seen. They average about 250 feet in thickness, and dip southwards at 40°. In general character they consist of dark gray slate beds, with a few thin crystalline limestones, thin gray grits, and gritty slate layers, all more or less fossiliferous. The most common fossils are:—*Orthis filiaria*, *Strophomena crenistria*, *Spirifer disjunctus*, *Athyris planosulcata*, *Fenestella plebeia*, and stems of Actinocrinus. At the base of the section, and resting on the upper Old Red, there is a set of thin gray grit layers and gritty slates, almost devoid of fossils, and probably occupying the position of certain well-marked beds in the Bantry Bay section, termed by Mr. Jukes, Comhola grits.

From Coolough Bay the Carboniferous Slates strike westerly, with the same dip as last observed, till they cross over from Muckross Peninsula (south of Brickeen Bridge), on to Brickeen Island, where they, as well as the upper Old Red beds, are cut off abruptly by a N. and S. fault, which he named the Brickeen Island fault; and here the Carboniferous Slates and Limestones of Muckross terminate to the west.

Returning now to the marble quarries, and taking those peculiar beds as a well-marked geological horizon, they can be traced eastwards for the distance of 1200 feet, when they abut against the Doo Lough fault, and are shifted northwards about 250 feet by the fault which is a downcast to the N. E.; where the line of this fault crosses the gray compact limestone, underlying the marble layers, the former is changed to a light brown dolomite. He remarked that the Doo Lough fault had a probable strike of N. 55° W., traversing obliquely across Muckross Peninsula from the small promontory on the south close to the Devil's Island, right through the centre of Doo Lough, and from thence into the small rocky inlet west of Ardnagluggen Point, on the north shore of Muckross.

On the north shore of Muckross, the limestones, though well exposed, do not present such clear sections as on the south; and at one inlet, to the east of the Carboniferous Slates of West Meadow Bay, a dyke-like mass of light brown crystalline dolomite, 6 to 8 feet thick, filled up an apparent fault in the limestone below the Carboniferous Slates of West Meadow Bay, which dip S. and S. E. at from 25° to 40°. The upper Old Red beds appear on the south shore of the bay.

UPPER OLD RED SANDSTONE.*

The upper Old Red observed in Muckross Demesne occurs in a band of about 400 feet in thickness; it is well seen in the south shore of West Meadow Bay, where its general strike is W.S.W. It abuts against the east side of the Doo Lough fault, which, being an upcast to the S.W., shifts it for a considerable distance to the southward; these beds are then traceable on the south shore of Doo Lough, from whence they continue westerly till they strike on Brickeen Island, where they are cut off by the fault previously noticed. They may be briefly described, in descending order, as consisting of:—1. Thick and thin quartzose grits. 2. Purple slates. 3. Greenish and gray shales, and slates with sandy slate beds, containing root-like impressions of plants. 4. Yellow grits and shales, with thin calcareous layers. 5. Gray grit. And lastly, purple slates.

Directly below the upper Old Red, just described, are a series of purple slates and grits, which preserve the same character for the thickness of 400 feet, when a mass of hard, irregularly bedded, light greenish-gray grits occur, quite free from purple slates. These form the cliffs from Ardnagluggen Point to the Gun Rock; calcareous bands occasionally appear through these beds.

The eastern half of Brickeen Island, with the adjoining rocky islets to the north, is formed of purple slates and grits; but these are cut off by the Brickeen Island fault, and abut against the lower greenish-gray grits which form the western extremity of the island.

To complete the description of the Carboniferous Limestones of

* In order to avoid any controverted points in the classification, it is thought best to use the term "Old Red Sandstone," instead of Devonian, throughout this paper. The beds, which are here called "Upper Old Red Sandstone," are believed to be those, more or less completely, which Dr. Griffith marks by a yellow band in part of this district, and denominates "Yellow Sandstone."

the district, he remarked that the Lower Lake of Killarney is formed almost entirely in the limestone ; Ash Island, Cow Island, and Yew Island, are portions of it; but on Rough Island appeared the marble and schistose layers first observed at the marble quarries of Muckross Peninsula,—a fact of much importance as determining the probable position of the Carboniferous Slates and other lower rocks at the bottom of the Lake. The rocky masses known as Elephant Rock, Table Rock, Crow Island, Otter Island, Jackdaw Rock, and Swallow Island, are formed out of the light gray laminated limestones, being portions of those beds which overlie the marble layers. The next place to the east where the marble layers occur is in the farm-yard attached to Cahernane House. From the peculiar position of these beds, they are probably brought to view by a N. and S. fault, occurring somewhere near the mouth of the Flesk River. Local protrusions of lower beds are rendered probable in this district by facts first observed by Mr. Du Noyer in the early part of 1855,—namely, a protrusion of upper Old Red in the midst of the Carboniferous Limestones, a few miles west of Mallow, at Dromaneen Castle on the Blackwater; and, later in the same year, similar Old Red beds occurring in the limestones at Kilmacclenyn Hill, five miles N. N. W. of Mallow,—where the former rock forms a low and gentle sloping hill, having the latter dipping away from it in every direction.

Leaving Cahernane Demesne, the next place where the marble layers are observed is at the low point on Ross Island shore, due north of the Rough Island, and eventually they appear, for the last time, on the south-west shore of Ross Island.

It will be recollected, that tracing out the geological horizon afforded by these marble layers is of the utmost importance in determining the relative position of the limestones of the Lower Lake.

The shaly and cherty limestones forming the western extremity of Ross Island are so contorted as to become inverted in dip, being folded back over to the north, and consequently dipping S. at various angles, forming V and S-shaped curves; and at O'Donoghue's Library, black shales, evidently a portion of the Carboniferous Slates, occur; the same beds are observed forming Innisfallen Island, and with the same mode of occurrence, as can be well observed on the west shore of that island, when the lake is at a low level. Brown or Rabbit Island presents higher beds than those last described, the

limestones being less shaly, and the black chert arranged in more definite layers.

Returning to the description of the Old Red Sandstone, he remarked that to the west of Brickeen Bridge the middle and lower beds were cut off by the Brickeen fault, and on the west of the fault, by an upcast, the purple or middle Old Red is brought to abut against the upper, and the Carboniferous Slates with the limestones are completely cut off. Mr. Du Noyer observed that Muckross Peninsula was a locality of peculiar interest to the geologist, as it presented what might be termed an epitome of the entire of the Carboniferous and Old Red Sandstone rocks of the south of Ireland. The Brickeen Island fault is therefore one of the best marked and most important of the district. The Upper Old Red is now lost, and it is not till we get on Dinish Island that it is again observed, when, by repeated inverted rolls of the beds, it is made to spread over the northern, western, and southern portions of the island. If we now cross from Brickeen Island to the boat-house on the Glena shore, under the cottage, we get into quite a different set of beds from those we have just left, though the distance is only 300 feet, the rocks agreeing in their strike. Along the west side of the island we had light greenish-gray grits in abundance, with but few dull purple slates; while, on the opposite shore of Glena, we can find nothing but soft purple slates and purple grit, without a single greenish-gray bed. We have therefore evidence of another N. and S. fault, which he named the Glena fault, on the west side of which, by an upcast, the upper Old Red is again brought to view, to the south of Glena Mount.

Proceeding south from Glena Cottage, we rapidly pass out of the purple slates and grits of the middle Old Red, and get on to the upper beds. These can be traced up the wooded stream which flows from the south flank of Glena Mount for the distance of 2000 feet westerly from the fault; leaving the stream from the point named, the same beds can be traced still farther for the distance of 1000 feet, where we come on the purple grits and slates of the middle Old Red; both groups of rock having a southerly dip at angles varying from 30° to 40°. Here the upper Old Red curves round to the east, and after repeated flexures of the beds along their line of boundary with the subjacent rocks, they eventually strike east, and abut against the Glena fault; all the observed dips over

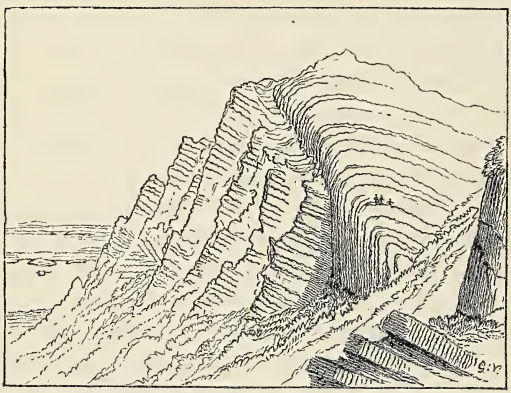
this portion of the upper Old Red are to the south, at from 30° to 40°, but here a refolding of the beds on each other is evident, which spreads them out to the extent of 2500 feet, in a north and south direction. Their normal thickness, however, of 400 feet, as measured in Muckross Demesne, would be quite sufficient to cover this extent of surface.

It is a remarkable fact, and one which is not sufficiently accounted for, that, on the west of the Glena fault, the upper Old Red rests conformably on the middle purple beds, while the latter are totally wanting on the east of the fault, the upper beds there resting on greenish-gray grits, with a few purple slates through them;—rocks in short, partaking more of the character of the lower Old Red Sandstone, to be presently described.

The Dinish Island upper Old Red extends as far south as the old weir bridge, where many sharp refoldings of the beds can be seen, giving a very good idea of the mode in which these rocks occur, to the west, as well as on the south shore of Torc Lake, where they lie at the base of Torc Mountain. The upper Old Red rocks which form the northern base of Torc Mountain can be best observed in ascending the stream forming Torc Waterfall; they consist of flaggy and irregularly bedded yellow and brown grits, with a few purple slates, light green shales, and light brown sandy layers, and light brown sandstones with purple slates; these beds are contorted repeatedly. Over Torc Waterfall are grayish-yellow flaggy sandstones; greenish-yellow shales; yellowish-brown quartzose grits, with purple slates: all these rest on the lower Old Red Sandstone, greenish-gray grits and purple slates, both being inverted in dip, that is, inclining to the south at 20°. The upper Old Red rocks, just described, stretch along the north flank of Torc Mountain, westerly, for the distance of about 2200 feet, when they are cut off by a fault striking in a N. and S. direction, from the "Quay" close to Torc Cottage; by an upcast to the west of this fault, their boundary is shifted to the north, for the distance of probably 500 feet; a second north and south fault, to the west of the one last observed, occurs near the boundary of Torc townland. This can be well observed in the stream forming this boundary; and the upper Old Red beds included between these two faults are much contorted, as can be well observed along the road skirting the Lake, where conglomeritic layers occur in the yellowish-gray grits, the pebbles

being quartz, and occasionally jasper. The result of the second fault is also an upcast on its west side, which again throws the boundary of the upper Old Red more to the north, at the distance of 1300 feet westerly; from the second fault we find a third fault, having the same general direction as the others, and, like them, shifting the beds to the north; and still further to the west, there is again a fourth fault, which produces precisely the same results as the others. In this manner the upper Old Red thins out, as it were, on the north flank of Torc Mountain, and appears but as a narrow band as we approach Dinish Island from the east. This fourth fault Mr. Du Noyer believed to be a continuation of that previously described, and named the Brickeen Island fault; it is therefore one of considerable magnitude and importance, producing so great an upcast on its western side as to bring to view the middle beds of the Old Red Sandstone in many places along the east shore of Dinish Island.

The beds underlying the upper Old Red of Torc Mountain differ essentially from those on the opposite shore of the Torc Lake; there they consist of purple grits and slates, here they are greenish-gray grits and slates, with a few purple slates through



Dead-cow Cliff, Torc Mountain, Killarney, looking East.

them. The Torc Island boundary fault, and two others which occur at the Dead-cow Cliff to the west, have aided in producing a singular modification in certain contortions of the beds along the

summit ridge on the north face of Torc Mountain; the general strike of the beds is here nearly east and west, but they are much contorted at the summit of the mountain; a short distance from it to the north, the crumpling of the beds begins to assume a definite arrangement, viz.:—a dip of from 70° to 85° north, suddenly changing to 25° south, and this along the line of strike of the beds for the distance of about 1500 feet; it appears that the crushing force here applied became so extreme, that the beds had a tendency to break along their strike, rather than bend, and being relieved by the Torc townland boundary fault on the east, and those at the Dead-cow Cliff to the west, they yielded along the strike of the synclinal curve, and formed an east and west fault. These beds, which dip at 25° south, abut against others, dipping 75° to 85° north, or often vertical; though faulted in this way, the amount of *vertical* dislocation may not be very considerable.

Proceeding now to Glena, and northwards along the shore, under Lady Kenmare's cottage, the only rocks we find are purple or liver-coloured slates and sandstone. At the point south of the rocky island called "Darby's Garden," is a broad band of thick-bedded, purple, conglomeritic sandstones, dipping S. 30°, resting on irregularly bedded and thick purple sandstones, with slates; and still lower in the series, at Slay and at Burnt Island are purple conglomeritic cornstones in the conglomeritic beds. Jasper pebbles frequently occur, and in cornstones the pebbles are purple grit and quartz, white quartz and jasper, in a rusty, calcareous, and sandy paste. When the cornstones are not conglomeritic, the calcareous portion consists of small lenticular layers, with a sandy or schistose matrix; and on exposed surfaces the rock assumes a dimpled appearance. Most of the purple sandstones extending from Darby's Garden to Stag Island are more or less calcareous. From the upper Old Red of Glena to the island just named, a distance of one mile and a quarter, none of the pale greenish-gray grits of Ardnagluggen Point in Muckross cross over to this shore, as their strike would suggest—a discrepancy which is the result of the upcast faults of Brickeen and Glena.

The summit of Tomies Mountain, 2414 feet, and that of Glena Mount, 2503 feet, exhibit purple grits and slates; at the latter there are many conglomeritic beds, similar to those near Darby's Garden on the Glena shore, and, like them, containing jasper pebbles.

If we now descend the south side of Glena Mountain, along the stream forming the parish boundary, and which falls into the upper Lake close to Arbutus Island, we find the purple grits and slates to continue for the distance of 2400 feet, and, when last observed, dipping N. N. W. at from 40° to 60°; here we at once pass out of these beds and get on green grits, with conglomeritic layers and green slates, all lying conformably under the purple beds just passed over; these I believe to be the upper portion of the lowest subdivision of the Old Red Sandstone, and the same rocks are persistent to the south, with some contortions, till they disappear in the Upper Lake. The best section of these lower Old Red beds is seen along the Kenmare road, at the base of Cromagloun Mountain; here the grits are often bright green, very hard, and many of them finely conglomeritic; these conglomeritic layers often consist of small scales of green and purple slate: the more decided conglomerates containing pebbles of jasper; purple and green slates are rather abundant in this section. All observed dips are southward from 35° to 45°, and the total thickness of the beds, as measured from near the lower lodge to the south of Stag Island Bay, cannot be less than 1500 feet; to this may be added 500 feet for beds observed at close intervals to the south, so that the section is increased to 2000 feet. As a mass, these beds curve round to the N. N. W., dipping from 65° to 75°, forming the promontory to the south side of the "Long Range," and presenting a series of salient angles pointing to the west, and passing through the centre of the Upper Lake, to its extreme western termination. At the head of the Upper Lake we have the same series of greenish-gray and green grits, and green and purple slates; though of course higher to the section than those last observed; and as they continue up the black valley, and form the base of the mountains on the north side, and the mountains themselves on the south, their absolute thickness may amount to 5000 or 6000 feet.

If from the head of the Upper Lake the ascent of Purple Mountain be made, 2730 feet in elevation, greenish-gray grits with conglomeritic layers, containing jasper pebbles, green and purple slates, with cornstones, are passed over, till, at the elevation of about 1100 feet, the upper purple grits and slates are again marked, precisely similar in character to those described as forming the upper portion of Tomies Mountain. All the beds here have a tendency to dip to the E. or N. E. at 40°, and the two groups are strictly conformable;

the pebbles of jasper ranging from the lowest to the uppermost of the conglomeritic beds; these can be observed on the very summit of Purple Mountain. Descending from Purple Mountain into the Gap of Dunloe, by the small lake called Glass Lough, and following the stream which flows out of it into the Gap, the upper purple grits and slates are observed to dip with tolerable steadiness to the east, at 20° to 25°, for the distance of about a mile and a half; nor do we get out of these purple beds till we descend to the elevation of about 1000 feet, or 413 feet above the level of this portion of the Gap; we have, therefore, passed through a thickness of purple grits and slates, amounting to 1730 feet, as determined by the elevations given on the Ordnance Maps; but if we measure by the probable stratigraphical thickness, we have from 2000 to 2300 feet as the most probable amount.

In the Gap of Dunloe, below the beds just described, we again find the greenish-gray grits, with conglomeritic layers, cornstones, and purple and green slates; these appear at both sides of the Gap with the same strike and angle of dip, viz.,—20° to 25° E. At the west side of the Gap the boundary line between the lower and the middle beds of the Old Red is about 250 feet higher than on the east, as would be the case if the beds on either side were projected across. Hence it is evident that the Gap of Dunloe is a valley of denudation, excavated along the strike of the beds.

Proceeding north through the Gap, the lower beds continue till we reach the southern extremity of the Black Lake. Here, on the east side they are observed to move round to the N. E., having the upper purple beds above them, which form the needle-like pinnacles called Tomies Rocks; and on the west of the Lake they appear to be cut off by an east and west fault, which, like that at Glena, brings the upper purple beds abutting against the lower greenish grits.

All the rocks round Cushavally Lake in the Gap are lower green beds; and, at the fault observed to the south of the Black Lake, these beds have a dip to the S. S. W. at 15°, with upper purple beds abutting against them on the north.

The cliffs overhanging this Lake consist of purple grits and slates, with a few cornstones, having a wavy dip to the west of 25°; and the uppermost observed beds have thick purple conglomerates, with cornstones through them,—the pebbles being quartz, and occasionally jasper. Still more to the north, beyond Coosane Lake, the road

is cut through a thick bed of dark purple conglomerate; close to the northern entrance to the Gap these beds dip south, at from 60° to 70°, here the upper Old Red beds are observed, occupying but a small space, and beyond them, to the north, brownish purple grits set in, which Mr. Du Noyer thought should be included in the middle Old Red Sandstone; the upper Old Red is therefore probably contorted out of its proper line of strike, and, with the associated beds of the middle Old Red, *inverted* in dip, thus forming an S curve at this part of its boundary line.

If we now make the ascent of the Reeks from the southern extremity of the Gap of Dunloe, we pass up the southern face of Drishana Mountain. As usual in the low grounds of this district, we find greenish-gray grits, with green and purple slates and conglomeritic layers in the grits; and it is not till we reach an elevation of 1400 feet or so, that we again come on the upper purple grits and slates, quite free from all green layers. The purple beds continue till we arrive at the most eastern summit of the Reeks, 2398 feet, and are persistent along the range dipping S. at 40°,—the crest of the mountain following accurately a series of regular contortions in the beds which twist them, from S. 40° to W. and N. W., and finally S. S. W., at the same angle.

The Reeks having now reached the elevation of 3062 feet, the summit ridge having an average strike of E. N. E., suddenly turn sharp round, and strike S. for the distance of 1000 feet. Here a singular prospect opens on the view,—a bare rocky peak, still higher by probably 100 feet, rises directly to the south, perfectly precipitous on its eastern face, where the edges of the purple grits and slates are observed to be contorted along their line of strike; while, on its western side, the smooth bed-surfaces of the rocks, as they dip in that direction, slope downwards, and form the precipitous cliffs overhanging Lough Cummannapeasta, lying 1100 feet below. This peak of the Reeks is so rugged and steep as to be quite inaccessible. He here remarked, that the pinnacle at the head of the Hag's Glen, N. E. base of Carrantwohill Mountain, called Stoompanaduff, the termination of a rocky ridge, is equally inaccessible. The entire summit ridge of the Reeks consists of purple grits and slates.

At the head of the Hag's Glen are the Lakes Gourach and Callee, the former being exactly half a mile east, in a direct horizontal line, from the summit of Carrantwohill Mountain, which is 3414 feet in

elevation. The level of this Lake above the sea is 1126 feet, and the rocks surrounding it are all purple grits and slates,—the middle subdivision of the Old Red Sandstone. Here again is obtained a natural section of these beds, amounting to 2238 feet, of vertical elevation, but if measured at right angles to the beds which dip, it would be increased to fully 3500 feet. Now all the rocks in the Hag's Glen to the north are those of the middle Old Red, and, as they dip westerly from 10° to 40°, they, of course, are higher beds than those last alluded to; and, consequently, the absolute observed thickness of the middle Old Red may be estimated here at 4000 feet.

From the foregoing observations it is clear, that in this district of the county of Kerry we have a development of the middle subdivision of the Old Red Sandstone (taking the Yellow Sandstone of Dr. Griffith as the upper), which, *per se*, would be quite sufficient to form the mountain ranges of the Knockmilldowns, the Galtees, the Mushera, the Cummeragh, or other Old Red mountain ranges in the south of Ireland, supposing the beds to be horizontal. Hence we have a strong argument in favour of the supposition that, wherever in the south of Ireland purple beds alone form the mass of the Old Red Sandstone, they should be regarded merely as the middle subdivision of that group. Such appears to be really the case, for in the districts of Ballyvourney, Gougane Barra, and Inchigeelagh, county of Cork, the green and greenish-gray grits and slates, with occasional purple slates, similar to those described as the lowest beds of the upper Lake and Black Valley sections,—but devoid of the fine conglomeritic layers observed so frequently in the latter rocks,—are the lowest beds in all the well-developed sections, and pass gradually and conformably into the purple grits and slates.

From having examined the Old Red Sandstones in the county of Waterford and Wexford, as well as in the county of Cork, at Mitchelstown, Mr. Du Noyer stated, that wherever he found it resting on the Silurian rocks, it lay unconformably on them; that its lowest beds were formed of coarse and fine conglomerates derived from the Silurian; that these conglomerates contained jasper pebbles; that they were often green in colour; and were split up by green and purple grits and slates. Therefore he saw, as yet, no reason why the green and greenish-gray conglomeritic grits, with green and purple slates, of the Lake district of Killarney, should be regarded as Silurian.

It appeared to him that in this district there was a better development of these, the lowest subdivision of the Old Red Sandstone, than he had observed elsewhere in the south of Ireland.

Directly N. W. of Lough Gourach, in the Hag's Glen, is a remarkable peak of rock called Stoompanaduff; and lower down the glen are the pyramidal masses called "The Hag's Teeth, Great and Little." These are evidently what would be called Needles, if they occurred on a coast line, and have been formed by the denuding power of the drift sea. Here the purple grits and slates have a dip to the west, of 10° to 25°, and are traversed by joints running nearly N. and S., E. and W.; the action of sea-breakers on such strata caused the mass to wear away on the cross joint, leaving pinnacles such as we now see standing out from the face of the cliff.

Descending from the summit of Carrantwohill on the south, to Lough Currachmore, which lies at the head of the northern spur of the Black Valley, a third natural section of the middle or purple part of the Old Red Sandstone is obtained. The summit of Carrantwohill is 3414 feet; Currachmore Lake, which is surrounded by these beds, is 1004 feet above the sea: hence the vertical section is 2410 feet in thickness, increased, if measured at right angles to the beds, to about 4000 feet; by adding the thickness obtained by this section to that of the Hag's Glen, a total amount of probably 5000 feet may be assumed as the thickness of the middle subdivision, or purple grits and slates of the Old Red Sandstone, in this locality. Allowing, therefore, 400 feet as the thickness of the upper Old Red or "Yellow Sandstone" of Muckross, and, say, 5500 as that of the lowest subdivision, or the greenish-gray grit with conglomeritic layers of the upper Lake and the Black Valley—we have a total of 10900 feet, as the observed thickness of the Old Red Sandstone formation of the Killarney district.

Proceeding down Curraghmore Glen, along the N.E. base of Sugarloaf Mountain, the lower Old Red rocks are alone observed; but, on making the ascent of this mountain, which is 2449 feet in elevation, we soon pass into the middle purple grits and slates which form the main mass of the hill, lying in a kind of trough in the lower beds, but in every instance strictly conformable to them.

The entire of the mountain ranges which now strike south by Lough Duff, the most westerly of the Black Valley Lakes, to the road leading to Lough Brinn, are composed of the middle purple

beds; at half a mile east of Lough Duff, in the Black Valley, the lower green beds are again observed, and they occupy the entire of the Black Valley.

Brassil Mountain, 1888 feet in elevation, in the Black Valley, and to the east of Sugarloaf, presents the same geological structure as Sugarloaf. On the summit levels of the Knocknabreda range, which skirt the Black Valley on the south, a certain set of beds occurs, partaking of the character of the lower as well as middle subdivisions; these may be about 350 feet in thickness.

If we traverse south from the Black Valley, across the rocky range of Knocknabreda, as far as Wind-gap, on the Kenmare and Killarney road, the lower green beds, with a few purple slates and conglomeritic layers, containing jasper pebbles, are alone observed; but as we descend the mountains on the Kenmare side, the rocks, after some well-marked synclinal and anticlinal curves, dip conformably under the middle purple grits and slates which form the mass of the mountain ranges on the north of the Kenmare valley.

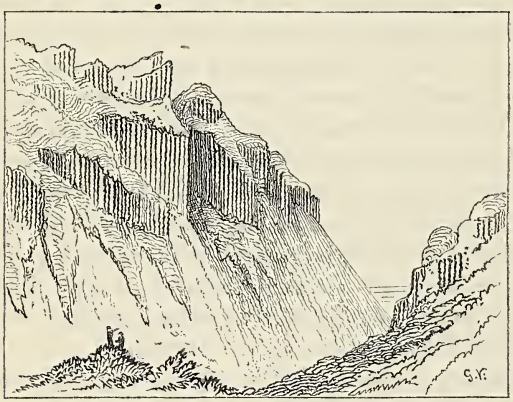
From the foregoing observations, it is clear that the Black Valley, with its branch to Curraghmore Lake, are valleys of denudation; the boundary between the lower and middle subdivisions of the Old Red, as proposed by Mr. Du Noyer, forming a contour line, varying from 1000 to 1350 feet above the sea.

In describing Mangerton Mountain, he remarked, that at the south entrance to the Devil's Punch-bowl, there occurs a boss of intruded felstone trap, about 500 feet in width, from N. to S. On the north side, the trap is very hard and compact, of a dull, purplish-gray colour, and slightly porphyritic,—the crystals being pale, yellowish-green felspar. It has a rudely laminated structure on the outer surface, where it comes in contact with the purple and green beds of the Old Red Sandstone. In the centre of the mass, the felstone weathers out in small spheroidal nodules; on the south side the felstone becomes flaky, passing into a green and ashy-looking rock, which weathers out in small dimple-shaped hollows; throughout, this trap weathers white.

This is the only instance of the occurrence of a trap rock in the district described, but in the Horse's Glen, to the east of Mangerton, dykes and bosses of greenish-gray felstone are of common occurrence.

The most remarkable protrusion of trap in the neighbourhood of Killarney is one first observed in the year 1855, by Mr. Fred.

Foot, of the Geological Survey, in the district placed under his examination; lying to the east of Mangerton, it forms the main mass of Bennaunmore Hill, one of the range of mountains lying directly south of Lough Quitane. In extent it is three-quarters of a mile from N. to S., and about a quarter of a mile E. and W. These traps are green and greenish-gray felstones, often porphyritic; and along the gorge to the east of Bennaunmore, they form magnificent ranges of columns from fifty to sixty feet in perpendicular height; in one place these columns are traversed by a dyke of pink felstone, six to eight feet in thickness.



Columnar Felstone, east face of Bennaunmore Hill, south of Lough Quitane, Killarney.

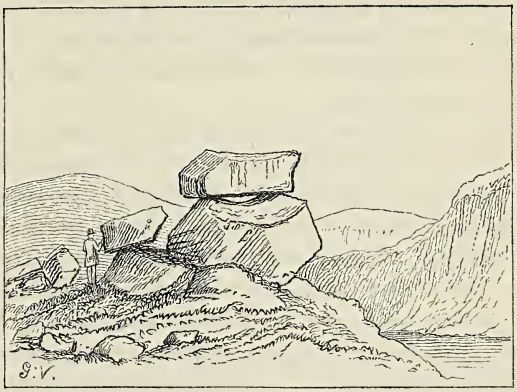
I shall not attempt further details connected with this most interesting locality, as I believe it is the intention of Mr. Foot to bring a notice of it before this Society.

The rocks observed at the Devil's Punch-bowl belong apparently to that portion of the Old Red between the lower green and middle purple beds, and are faulted in a N. W. direction, at the cliffs to the east of the Lake.

In alluding to the trap rocks, Mr. Du Noyer called attention to a protrusion of fissile brecciated, as well as compact greenstone, occurring in the midst of the Carboniferous Limestones in the parish of Subulter, three miles east of Kanturk; it forms a hill of about half a mile from N. to S., and a quarter of a mile from E. to W., having the limestone dipping away from it in every direction. His

attention was directed to this interesting fact by Sir Denham Norreys, of Mallow Castle, to whom is due the credit of having first observed this trap more than fifteen years ago, and it has not been recorded on any Geological Map.

In alluding to the drift of the Killarney district, he remarked the occurrence of large, angular, perched boulders of green grit, on the top of the mass of coarse angular drift which lies directly to the north of the Devil's Punch-bowl, and which dams up the water of that singular lake. These perched rocks occur at a height of



Perched Boulders of Green Grit, summit of mass of angular debris, north side of Devil's Punch-bowl Lake. Elevation of Boulder above the sea, 2319 feet.

2319 feet above the sea, the greatest elevation at which such boulders are observed in this district. The sea of the glacial drift period, must, therefore, have covered this spot in sufficient depth to have floated ice blocks capable of bearing and transporting boulders of many tons in weight.

If now we suppose the sea, at this presumed level, to have extended over the district just described, we find that the summits of Purple Mountain, Tomies, the Reeks, Carrantwohill, Benkeeragh, Skregmore, and Sugarloaf Mountains would have formed a group of islands, extending in an E. and W. direction, with the Black Valley as a deep sea channel, and the Knocknabreda and Cromagloun ranges as rather shoal water. It was remarked that the summits of the hills just named are all regularly escarped, and covered with *angular débris*, or shingle, the result of atmospheric rather than of aqueous agency.

When we descend the mountains from their tops to about 2300 or 2000 feet, we find many blocks more or less water-worn, and the sides and summits of the hills more or less rounded. Hence we are enabled to determine the amount of elevation to which this portion of the county of Kerry has been subjected since the period of the ice-bearing sea.

It is remarkable that Mangerton Mountain, though 2756 feet in elevation, presents a marked difference in outline to those less elevated peaky summits,—Purple Mountain, Tomies, and Skregmore; it is quite rounded on all sides, and flat for a considerable extent on its summit. This, however, may be accounted for, by supposing a difference in the original form of the mountains and valleys before the period of the glacial sea.

The surface of all the rocks in the Black Valley, as well as on the flanks of the adjoining hills, and along the shores, and on the islands of the Upper Lake, are all smoothed and striated, in lines and small furrows, running east and west, or parallel to the longest axis of the valley. All detached rock masses are rounded so as to form noses facing the west, a fact which determines the direction of the drift in this locality,—though such currents may have been merely local. The theory of a great northern drift is not invalidated by these observations; because, in the flats along the northern flanks of the chain of mountains which extend from Carrantwohill to beyond Mallow, boulders of porphyritic and syenitic granite are frequently observed, especially on the coal-measures and limestones to the north of Mallow. Mr. Du Noyer remarked that in the limestone gravel close to Clonmel, county of Tipperary, he had formerly observed a rounded lump, from the "Greensand," or mulatto stone of the county of Antrim, containing its characteristic fossils,—the most easily detected of all the cretaceous rocks of the north of Ireland. At the period of the last elevation of the Reeks, Carrantwohill, and the adjoining mountains, the current set in from the west and south, and at the place now called the Gap of Dunloe, a branch current to the north ran through it from out of the Black Valley; all along this valley the rocks are striated north and south in many places. When the lower green grits at the south of the Gap came to be acted on, they resisted the wear and tear of the sea, deflecting the current to the east so as to leave the head of the Gap dry land; the whole force of the water was now applied against the west flank of

Torc Mountain, and here we observe the glacial striæ running straight up its side.

To the east of Cromagloun Cascade is deposited an enormous accumulation of drift, arranged in lunette masses, and filling up what was once a bay half a mile wide, on the S. W. flank of Torc Mountain; all the *débris* here observed has been derived from the mountains to the west. The current now struck north, wearing away the east side of Glena Mountain, along with the limestones of Torc Lake. The mass of drift thus produced, as well as that carried from the northern faces of the Killarney range, appears to have been swept easterly towards Millstreet, forming that extraordinary and vast accumulation of drift observed at the mouth of Glenflesk, and in that neighbourhood.

In these latter observations, Mr. Du Noyer wished to guard himself against being supposed to maintain the opinion that these drift accumulations and glacial effects were the result of sudden action, since they are quite explicable on the supposition of a comparatively tranquil agency, continuing over an indefinite period of time.

THE Society met on the 12th of March, 1856, on which occasion the following Paper was read.

RESEARCHES AMONG THE PALÆOZOIC ROCKS OF IRELAND, WITH A VIEW TO DETERMINE THE LIMITS OF THE OLD RED SANDSTONE, AND ITS RELATION TO THE INFERIOR ROCKS. BY JOHN KELLY, ESQ.

IN the present paper, the division of the Palæozoic rocks to be principally treated of, is that called the Old Red Sandstone. This rock appears to have been recently mistaken for others, and as we have four or five sandstones, it becomes necessary to define clearly which of them is the one under consideration,—as, whatever division of the crust of the earth first got the name, should be the one entitled to retain it. I shall begin by quoting a few sentences from the works of geologists, to show what was understood to be the Old Red Sandstone a few years ago.

Dr. Mac Culloch, in his "Treatise on Geology," published in 1831, at page 288, vol. i., says:—"The lowest bed of the secondary strata in England is the Old Red Sandstone, being the first of the secondary rocks in the artificial classification; it must not, however, be

considered as a simple rock, since, besides the conglomerate which is essential to it, it sometimes contains shales and limestones, and occasionally coal. The next bed in the order upwards is a limestone containing a few fossil remains, and known by the name of Mountain and of Carboniferous Limestone."

Professor Phillips, in his "Geology of Yorkshire," gives a Table at page 11, in which he divides the Carboniferous system into three principal parts: the Coal Formation, Carboniferous Limestone, and Old Red Sandstone; and he says:—"The Carboniferous system does undoubtedly permit itself to be considered in three series, characterized by the prevalence of coal, limestone, and Red Sandstone." In his "Geology" in the Cabinet Cyclopædia, he adheres to the same subdivisions, and calls it "a triple system."

The descriptions given by those writers appear clear and satisfactory, and point out distinctly their idea of the position of the Old Red Sandstone; and I would say, their views on the subject do not appear to me to require any alteration or modification; and I therefore adopt the position and the type of that rock, as pointed out by them.

In Ireland the Carboniferous formation is divided into a similar triple system; and though its subdivisions everywhere differ widely from each other in lithological appearance and mineral character, yet the whole system is characterized by the remarkable circumstances:—1. That the strata of which it is composed rest unconformably on whatever rock lies below them; 2. That they are covered unconformably by the overlying rock; and, 3. That they are parallel to one another, or lying, as it were, in one bundle: thus, though in three groups of different mineral character, yet clearly pointing to one geological epoch, in which the whole suite, from beginning to end, was deposited, without any great catastrophe or disturbance, in its position or succession. Wherever we can see a clear junction or a good section, we generally find the beds of the older, or underlying rocks, thrown up on their edges, at a steep angle; while the beds of the Carboniferous system lie on them at a comparatively low angle, and often nearly level.

The Old Red Sandstone may itself be divided into three parts, differing from each other chiefly in lithological appearance:—

1. The first or lowest is usually a band of red conglomerate, composed of rounded pebbles of white quartz, brown quartz, purple horn-

stone, jasper, and fragments of other rocks, united into a hard mass by a mineral paste or matrix. The pebbles are sometimes hardly set in the cementing matter, and sometimes so loose as to be easily detached by a blow of the hammer, leaving a smooth cavity. In this part there are sometime alternations of red sandy beds, almost without pebbles. In some localities there are in the mass rounded stones of mica slate, with very little else, as at Cushendall, or green chloritic slate or green grit, as at Lane, near Skerries. Its whole thickness varies in different places from 20 to 100 feet.

2. Next comes a series of Red Sandstones, and red shales, in alternate bands, between 200 and 600 feet thick.

3. The upper part is composed of thick beds of sandstone, mostly of a whitish or yellowish colour. This upper part of it is the Yellow Sandstone of Mr. Griffith. It sometimes contains thin beds of limestone, or thin gray or red bands of calcareous slate or shale, interstratified with the sandstone; those beds of limestone and slate all contain the usual fossils of the mountain limestone. The yellow part of this sandstone is from 50 to 200 feet in thickness, and sometimes contains a few of the fossils.

A good type of this rock is visible at Templetown, near Hook Head, in the county of Wexford, where it is exposed in a coast section, and the bottom and the top are clearly seen.

The typical character is often, however, different from this at Hook Head. In the North of Ireland the prevailing colour of the rock is red; so it is in the eastern part of Tyrone near Cookstown, in Down at Castle Espie, and at Armagh; while in the South and West of Ireland the yellow colour prevails: this is the case in the King's and Queen's Counties, where this rock is seen mantling round the Slievebloom Mountains, near Mountmellick, Kinitty, and Roscrea; in Tipperary, at Borrisoleigh and Cappawhite; in Clare, round the Derrybrian Mountains, near Woodford, Gort, and Scariff; and in Kerry, at Kerry Head, and Slievemish near Tralee. I may add, that on the east side of Knocksheegowna, near Borrisokane, there is very little Red Sandstone at all, the rock being yellow to the lowest beds visible, and at Toberelathan, six miles S. W. of Loughrea, a yellow colour prevails, even in the lower beds of the conglomerate, and here there is a clear and good section.

I have just stated that the Old Red Sandstone lies unconformably on the rocks which support it. This, in Ireland, is generally gray

clay slate, interstratified with gray grit beds, the old grauwacke series, which includes both Cambrian and Silurian rocks, but it sometimes rests on other rocks, as I shall show.

To point out more clearly some of the facts supporting the views I take, I have drawn up the following Table, which shows in several localities the dip of the supporting rock near the junction, and the unconformable dip of the sandstone, as set out in the headings of the columns. It rarely happens that a good junction with the two kinds of rock can be seen; but in the greater number of cases the observations are made within a short distance of each other, and since the beds of the Carboniferous formation throughout are parallel to one another, two different rocks, visible at spots, even a furlong distant, can be known to be conformable or otherwise, where no sign of undulation or disturbance is visible in the vicinity. I begin with the northern counties, and proceed southward:—

TABULAR LIST OF LOCALITIES IN IRELAND, *where Junctions occur, of Old Red Sandstone, with the Rocks which lie beneath it.*

No.	County.	Townland, with Distance and Direction from the nearest Post Town.	Underlying Rock and Dip.	Dip of Old Red Sandstone.
1	Mayo, . . .	Conaghra, 5 miles W. of Ballycastle, . . .	Stratified quartz rock, S.E. 25°,	N.E. by E. 20°.
2	,,	Briska, 1 mile S.E. of Bangor, ...	Quartz rock, N.E. 70°,	E. 5°.
3	,,	Derrycleetagh, 1½ mile N.E. of Newport, .	Mica slate, N.W. 20°,	S.W. 10°.
4	,,	Tevenish West, 10 miles S. of Castlebar, .	Mica slate, S. 30°,	S.E. 10°.
5	,,	Cloonagleragh, 4 miles N.E. of Castlebar, .	Mica slate, N.W. 80°,	S.E. 15°.
6	,,	Ballaghaderreen, ¼ mile W. of the town, . .	Brown slaty porphyry, N. 60°,	S. 10° to 20°, thin yellow beds.
7	Sligo, ...	Lugnaduffa, 7 miles W. of Ballysadare, .	Mica slate, S. 25°,	Level.
8	,,	Clonacool, 13 miles S.W. of Cooloony, . .	Mica slate, N.E. dip,	S.E. 15° to 30°.
9	Donegal, . .	Ballykilowen, 11 miles N.E. of Ballyshannon,	Mica slate, N.E. 50°,	S.W. 20° to 15°, limestone near.
10	,,	Cormullin, 8 miles N.E. of Ballyshannon, .	Mica slate, N.W. 60°,	N.W. 25°.
11	,,	Coolcholly, 1 mile N.E. of Ballyshannon, .	Mica slate, N.W. 40°,	N.W. 18°, dolomite.
12	Londonderry, .	Drung, 10 miles N.E. of Londonderry, . .	Mica slate, strike N.E.	E. 20°.
13	,,	Drumcovit, 3 miles S.W. of Dungiven, . .	Mica slate, N.W. 50°,	E.S.E. 5°.
14	,,	Tirkane, 4 miles N.W. of Maghera, . . .	Mica slate, N. 30°,	E. 30°.
15	,,	Doon, 2 miles W. of Draperstown, ...	Mica slate, W. 45°,	E. 15°.
16	Tyrone, . . .	Grouse Lodge, 4 miles N.E. of Pettigo, . .	Mica slate, N.E.,	S.E.
17	,,	Seegronan, 6 miles S.W. of Castlederg, . .	Mica slate, S.E. 60°,	S. 30°.
18	,,	Derrygoon, 4 miles N. of Drumquin, . . .	Mica slate, W. 50°,	S. 15°.
19	,,	Rossnamuck, 4 miles N. of Omagh, . . .	Mica slate, N.W. 80°,	W. 40°.
20	,,	Lisky, 4 miles N.W. by N. of Newtownstewart,	Mica slate, N.W. 20°,	S.W. 35°.
21	,,	Kildress, 3 miles W. of Cookstown, ...	Greenstone,	E. 10° to 30°.
22	,,	Latbeg, 2 miles N.W. of Clogher, ...	Brownstone, N.W. 40°,	S. 20° on Eskermore.
23	Antrim, . . .	Gortnagross, 1 mile S.W. of Cushendall, . .	Mica slate, S.W. 35°,	S.E. 10°.
24	Down, . . .	Castle Espie, 2 miles S.E. of Comber, . . .	Gray clay slate, vertical,	N. 15°.

No.	County.	Townland, with Distance and Direction from the nearest Post Town.	Underlying Rock and Dip.	Dip of Old Red Sandstone.
25	Down, . . .	Carrowreagh, 3 miles W. of Newtownards, .	Gray clay slate, S.E. 70°,	S. 10°.
26	,,	Craigavad, 4 miles N.W. of Newtownards, .	Gray clay slate and grit, S.E. 80°,	N.W. 10°.
27	Armagh, . .	Drumadd, ½ mile E. of the town, ...	Gray clay slate, S.E. 45°,	N.W. 15°.
28	Fermanagh, .	Coolbuck, 2 miles N.E. of Lisbellaw, . . .	Gray clay slate, N.W. 50°,	S.E. 15° to 20°.
29	,,	Glengesh, 4 miles N.E. of Tempo, ...	Brownstone, N. 20°,	S.E. 5°.
30	Louth, . . .	Kilcurry, 3 miles N.W. of Dundalk, . . .	Gray clay slate and grit, vertical,	E. 10°.
31	,,	Plaster, 3 miles N.W. by N. of Dundalk, .	Gray clay slate & gray grit, N.W. 80°,	S.E. 15°.
32	Cavan, . . .	Cullees, 2 miles N. of Cavan, ...	Gray clay slate, E. 40°,	W. 10°.
33	,,	Drumany, 2 miles S.W. of Killeshandra, .	Gray hard grit, S. 50°,	Level at Portlongfield.
34	Meath, . . .	Maperath, 3 miles N.W. by N. of Kells, . .	Gray clay slate & gray grit, N.W. 70°,	E. 15°.
35	Dublin, . . .	Portrane Pier, 4 miles N.E. of Swords, . .	Greenstone,	N.W. 25°.
36	,,	Lambay Island, 10 miles N.E. of Malahide,	Greenstone,	N. 60°.
37	Kildare, . . .	Barnacrow, 5 miles N.W. of Newbridge, . .	Greenstone,	N.E. 20°.
38	,,	Grangeclare, 3 miles N.W. of Kildare, . .	Gray clay slate, S. 70°,	N. 12°.
39	Longford, . .	Farnagh, 1 mile S. of Longford, ...	Gray clay slate, N.W. by N. 65°,	W. 3°.
40	,,	Knocknahaw, 1 mile S.E. of Longford, . .	Gray clay slate, N.W. 80°,	N. 3°.
41	,,	Gaigue, 2 miles N.E. of Drumlish, ...	Gray clay slate, S.E. 35°,	Level.
42	Leitrim, . . .	Corduff, 6 miles E. of Mohill, ...	Clay slate, strike S.W.,	S.W. 10°.
43	Roscommon, .	Cornaglia, 3 miles N.W. of Boyle, ...	Brownstone, N. 10°,	S. 7° at Ballinphuil.
44	,,	Derryherk, 4 miles N.E. of Boyle, ...	Gray grit, N.W. 5°,	S.E. 20°.
45	Galway, . . .	Derrylaura, 1 mile N. of Oughterard, . .	Granite,	S.E. 20°.
46	,,	Cregganor (Toberelathan), 6 miles S.W. of Loughrea, ...	Gray clay slate, E. 60°,	N.W. 45°.
47	,,	Ballycuddy, 4 miles S.W. of Loughrea, . .	Gray clay slate, E. 70°,	N.W. 50°.
48	King's Co., .	Cummer, Lower, 1½ miles S. of Kinitty, .	Gray clay slate, S.E. 70°,	N. 10°.
49	,,	Aghagurty Bridge, 2 miles S.W. of Kinitty,	Gray clay slate, W. 70°,	W. 10°.
50	Queen's Co., .	Glenkitt, 8 miles W. of Mountrath, ...	Gray clay slate, N.W. by N. 65°,	S.E. 5°.
51	Kilkenny, . .	Ballygowan, 1 mile S.W. of Kilmaganny, .	Gray clay slate, strike S.W.	N. 20°.

No.	County.	Townland, with Distance and Direction from the nearest Post Town.	Underlying Rock and Dip.	Dip of Old Red Sandstone.
52	Tipperary, . .	Gortanarible, 5 miles N.E. of Borrisokane, .	Gray grit, N.W. 70°,	E. 25° at Skehanagh.
53	,,	Carrick, 2 miles S.E. of Moneygall, . . .	Gray clay slate, N.W. 65°,	S.E. 20°, limestone.
54	,,	Knockanevin, ½ mile N.W. of Borrisoleigh,	Gray clay slate, S. 60°,	S.E. 25°.
55	,,	Lackanacoombe, 2 miles N.E. of Cappawhite,	Gray clay slate and grit, S.E. 60°,	S.W. 10°.
56	,,	Ahenny, 5 miles N.W. by N. of Carrick-on-Suir,	Gray clay slate, N.W. 60°,	S.W. 30°.
57	,,	Rathclarish, 5 miles N. of Carrick-on-Suir,	Gray clay slate, N.W. 60°,	S.W. 30°.
58	Clare, . . .	Lecarrow Lower, 1½ miles E. of Feakle, . .	Gray clay slate, S.E. 25°,	Level.
59	,,	Gortacullin, 1 mile S. of Broadford, . . .	Gray clay slate, S. 80°,	N. 10°.
60	Kerry, . . .	Ballyoughteragh (Sybil Point), 7 miles N.W. of Dingle, ...	Brownstone, S.S.E. 70°,	N.N.W. 60°.
61	,,	Ballinahow (Coosathouick), 7 miles N. of Dingle,	Brownstone, S.S.E. 70°,	N.N.W. 60°.
62	,,	Kinard, 4 miles S.E. of Dingle (Coosathurrig),	Brownstone, S. 80°,	Nearly level on average.
63	,,	Glenteenassig, 4 miles N. of Aunascaul, . .	Brown micaceous flag, N.W. 65°,	N.W. 25°.
64	,,	Doon Hill, 4 miles N.E. by N. of Aunascall,	Green grit, thick beds, W. 60°,	N.N.W. 30°.
65	,,	Cummeen, 4 miles N.E. of Aunascall, . . .	Green grit and slate, W. 65°,	N. 30°.
66	,,	Derrymore West, 8 miles S.W. of Tralee, .	Green grit and slate, vertical,	Nearly level.
67	Cork, ...	Quartertown, Upper, 1½ miles S. of Mallow,	Brownstone, average S.E.,	N. 15°.
68	Waterford, . .	Newrath, ½ mile N.E. of Waterford, . . .	Green grit, N.W. 80°,	N.W. 15°.
69	,,	Glenhouse, 2 miles S.E. by S. of Portlaw, .	Gray slate, S.W. by S. 80°,	N. 60°.
70	,,	Drumrusk, 2 miles S.W. of Passage, . . .	Green grit, N.W. 70°,	N.E. 20°.
71	Wexford, . .	Park, 2 miles N.W. of Wexford, ...	Gray clay slate, N.W. 40°,	E. 20°.
72	,,	Rocksborough, 1 mile S. of Wexford, . . .	Quartz rock, N. 20°,	S.E. 20°.
73	,,	Starvehall, 2 miles S.W. of Wexford, . . .	Quartz rock,	S.E. 20°.
74	,,	Hodges' Mill, 5 miles S.W. of Wexford, . .	Mica slate, N. 20°,	S.E. 25°.
75	,,	Duncormack, in the quarry at the village, .	Gray grit and slate, S.W. 20°,	S.W. 25°.
76	,,	Nook, ½ mile N.W. of Ballyhack, ...	Gray clay slate, S.E. 30°,	N.W. 10°.
77	,,	Templetown, 4 miles S.E. of Duncannon, .	Gray clay slate, N.W. 60°,	S.S.W. 15°.
78	,,	Lambstown, 1 mile S. of Fethard, ...	Gray clay slate, 80°,	S.E. 15°.

I have in this Table recorded the dips of both rocks, at or near the junctions, in seventy-eight localities; and I might easily give double the number, were it not that, when I was employed on the General Valuation of Ireland in the north, though careful to note the dip at every opening of sandstone I met, I omitted in many instances to take the necessary pains to determine the dip of the mica slate or clay slate in the vicinity, as that is frequently obscure, from the cleavage of the slate, or from being covered with drift. This was more especially the case in the county of Tyrone, about Plumbridge, and thence along the southern bases of the Bessy Bell and Mary Gray mountains, towards Castlederg.

It will be seen also in the Table that, in those seventy-eight localities,—

The Old Red Sandstone rests on mica slate . .	in 19	cases.
On gray clay slate, ...	27	,,
On gray grit, or quartzite, ...	3	,,
On gray grit, interstratified with gray clay slate, .	6	,,
On green grit, ...	3	,,
On green grit, interstratified with gray clay slate, .	2	,,
On brownstone, or brown hard grit, ...	7	,,
On brown micaceous flag, with brown or purple slate,	1	,,
On yellowish-white stratified quartz rock, . . .	2	,,
On yellowish-white quartz rock, bedding obliterated,	2	,,
On brown porphyry, ...	1	,,
On greenstone, ...	4	,,
On granite, ...	1	,,

This abstract shows, perhaps more clearly than any other evidence I could adduce, that, after the great disturbing forces which rolled the earliest stratified rocks into such undulations, as we now find in them, followed by a powerful denuding agency, that broke up and carried away the tops of many of the anticlinal convolutions formed in them, and left the beds thrown up on their edges, the conglomerate of the Old Red Sandstone was the first layer, or foundation of a new building—the Carboniferous formation. This band was laid down upon those edges of the older rocks, as they happened to present themselves, whether slate, grit, quartz, lime-

stone, or any other rocks, and whether gray, green, red, or brown. I look upon this band of conglomerate as a most important landmark, or index, in Geology; it is the boundary between two distinct periods of organic life, and, besides the changes in the genera and species of the animals that existed below and above it, there is a well-marked difference in the lithological character of the rocks also—the more ancient being much harder. Those hard grits, crystalline limestones, and clay slates, of the older period, have their representatives in the soft sandstones, ordinary limestones, and shales of the newer.

Grit and sandstone are two names which appear to be often used, one for the other, in Geology. Grit, in this paper, means a very hard, quartzose, rock, often green or gray, sometimes dark brown, and found in the older and lower sedimentary rocks, interstratified with green, gray, or purple slates, having a distinct cleavage. Those grits are generally very refractory under the hammer or chisel of the workman. Sandstone, on the contrary, is a soft, sandy rock, easily split into rectangular blocks, or chiselled for economic purposes. Sometimes it is red, sometimes yellow or white. Such in Ireland is usually got in the Old Red Sandstone, and in the Coal series.

In the foregoing Table, also, some of the localities exhibit points of geological interest, to those who may visit them, worthy of a few remarks. I shall notice them separately and consecutively, in the order in which they are numbered at the end of this paper.

In treating of this subject, it appears desirable to make an attempt at determining the thickness of this division of the Carboniferous system. It is not easy to get good sections of it, for it frequently happens that the bottom or the top is not clearly visible; the rock not always well exposed from being covered with drift, or there may be a fault, and consequent downthrow of the strata, and the surface made even afterwards by denudation, making it impossible to detect the fault. Therefore, the thicknesses resulting from sections can seldom be depended on for anything more than an approximation to the truth. I have selected a few of the best sections I know, and, from the heights given on the Ordnance maps, laid them down on the same scale of length and height, in the shortest line across the strike; then, measuring the thickness from the bottom

to the top, I give the results as they turned out, in the following tabular statement:—

No.	County.	Locality.	Feet.
1.	Armagh, . .	At Annaclare, 2 miles N. E. of Armagh, .	1090
2.	Sligo, . . .	At Clonacool, 12 miles S. W. of Colooney, .	1020
3.	Roscommon, .	At Boyle, through the town, ...	740
4.	Galway, . *c*	At Toberelathan, 6 miles S.W. of Loughrea, .	430
5.	Clare, . . .	At Capparoe, 1 mile N.W. of Tomgraney, .	790
6.	,, . . *d*	At Raheen, 1 mile S.W. of Tomgraney, . .	1460
7.	,, . . .	At Killea Church, 4 miles N. of Limerick, .	630
8.	Tipperary, .	At Newtown, 3 miles N.W. of Nenagh, . .	1220
9.	,, . .	At Ballywilliam, 3 miles S.W. of Nenagh, .	910
10.	,, . .	At Birdhill, 10 miles S.W. of Nenagh, . .	1230
11.	,, . .	At Curraghglass, 1 mile N. E. of Borrisoleigh,	1050
12.	Kilkenny, *e*	At Currahill, 1 mile W. of Kilmaganny, .	1680
13.	Wexford, . *f*	At Croats, 2 miles S.W. of Wexford, . . .	310
14.	,, . *f*	At St. Lennan's, 7 miles S.W. of Wexford, .	260
15.	,, . *f*	At Duncormack, 9 miles S.W. of Wexford, .	230
16.	,, . *g*	At Templetown, 5 miles S. E. of Duncannon,	450

OBSERVATIONS ON SOME OF THE FOREGOING SECTIONS.

2. The section at Clonacool is on the south-east flank of the Ox Mountains. It ought to be a good average one. The red rock is well exposed in the river, the dips pretty regular, and the data generally good.

3. At Boyle, from the depth of the bed of the river below the land adjacent, that there may be a fault in this line. This would derange the succession in the section.

4. The section at Toberelathan, near Loughrea, is a good and clear one; both the bottom and the top of the band are visible there. The result of the measurement gives only 430 feet as its thickness, which appears very small. It is a remarkable fact, in the Carboniferous system in Ireland, that in the north the sandstones are thick, and limestone comparatively thin; while in the south the reverse takes place, the limestone is thick, and the sandstone thin. In the river at Kildress, near Cookstown, the Old Red Sandstone appears in the river for above a mile of its length, but there is so much disturbance in the strata, that a satisfactory section, as to thickness, could not be made. It probably exceeds 1000 feet. A

similar conclusion results from observing the volume of the sandstone at Scrabo, near Newtownards, in the county of Down, and at Armagh; while the limestone about Cookstown, perhaps, does not exceed 200 or 300 feet. Contrast this with the south. The sandstone at Toberelathan, as just stated, is 430 feet. The limestone at Black Head, in the county of Clare, immediately south of Galway Bay, shows about 1200 feet in thickness over the sea level, in one of the best exposed and least disturbed sections in Ireland, besides some under the water, the thickness of which is not known.

6. At Raheen, near Tomgraney, in Clare, I am inclined to doubt the result, 1460 feet. The section at Capparoe (No. 5), not two miles off, is only 790 feet, and this is backed by the section (No. 4) at Toberelathan, on the same band of sandstone, which, as just stated, is only 430 feet. The dip is low at Raheen, and, though the rock is visible at bottom and top, the section in the middle is covered with drift. A slight change of dip, from 10° to level, or an undulation under the drift, would nullify the result.

12. At Currahill, in Kilkenny, the result, 1680 feet, appears large, but I give it as it turned out. There is a change of dip in the section; it gets flatter proceeding northward, towards the limestone; and the point where the change from 25° to 20° takes place, is not clear.

13, 14, 15. The three sections, at different places, on the east flank of Forth Mountain, in Wexford, give the result as unusually thin. There may, possibly, be a fault along the south-east side of the mountain, near the edge of the quartz rock, in which some of the thickness may be buried. Indeed, there are grounds for supposing that the quartz rock mass of Forth mountain was pushed up, in the fact that, the tertiary blue marl of the county of Wexford, along its western or highest margin from Gorey, by Camolin and Enniscorthy, towards Wexford, is found at a general level of about 200 feet over the sea, with only one exception that I know, and that is on the eastern side of Forth Mountain, two miles south-west of the town of Wexford, where a patch of this marl, resting on quartz rock, occurs at a height of something above 300 feet. This fact affords a strong presumption that Forth Mountain itself was forced up above the general level of the country, since the deposition of the blue marl; and, if so, there must be a fault along the eastern boundary of the quartz rock, or near it.

16. At Templetown, near Hook Point, the rock is well exposed all the way on the shore, and yet the resulting thickness appears small; but there are two faults in this section, by each of which there appears a downthrow to the south, the amount of which cannot even be guessed at. This makes the result, in this section, too little. On account of the rock being well exposed, this is one of the best typical sections I know, and in the upper part of it, at Porter's Gate, the yellow sandstone of Mr. Griffith is particularly clear, and separated from the main body by a band of calcareous black shale, containing thin beds of gray limestone, both shale and limestone being full of the fossils of the mountain limestone.

The general average of the thickness of the Old Red Sandstone, as measured in the foregoing sixteen sections, is 840 feet. Taking out six of the most doubtful, that is, Nos. 6, 12, 13, 14, 15, 16, in the Table, the average of the remaining ten sections is 910 feet. Four of the best of them, viz., Nos. 1, 2, 9, 11, give an average of 1018 feet. In short, about 1000 feet may be considered as the thickness of this division. It will be at once apparent, that measurements of the thickness of this rock, in Ireland, fall very far short indeed, of the ideas of thickness derived from reading published accounts of the Old Red Sandstone of Great Britain.

Having thus, as well as I could, pointed out marks for the identification of this subdivision of the Carboniferous rocks, in the band of conglomerate at its base, its average thickness, and, above all, the unconformable position in which it lies on the supporting rocks,—I now come to consider the second part of my subject, that is, the relations of those older rocks among themselves.

The Dingle peninsula is the key of the geology of the south of Ireland. From the extent of sea coast and of rocks laid bare, I know of no place where they can be studied with more advantage, and the fossils they contain afford proofs of their true place, if doubt or obscurity existed regarding them. In no other place are found such clear junctions, or such decided proofs that the Old Red Sandstone, and the rocks on which it rests, are of two different epochs in the earth's history. I shall, therefore, enter on a short account of the Geology of that district.

Besides the New Red Sandstone, and the Old Red Sandstone, we have in Ireland another Red Sandstone, or grit, which, I have reason to believe, has frequently been confounded with, or mistaken

for, the Carboniferous Old Red, which I have been describing. It is of true Silurian age, as I shall presently show. It is awkward to have two or three rocks, of two or three geological epochs, bearing the same name, Red Sandstone. This rock occurs in four or five other parts of Ireland, but it especially prevails in the south, where it is called by the peasants "Brownstone;" and as this appears an appropriate name, for colour at least, I adopt it, for sake of distinction, as a Silurian rock.

At Ferriter's Cove, on the coast, eight miles N. W. of Dingle, a band of gray slaty rock dips S. E., at an angle of about 70°, and is full of Silurian fossils. This band, from Doon Point, its N. W. extremity, across the strike, is about half a mile wide on the surface, or at this dip 2500 feet in thickness. A band of brownstone strata underlies this fossiliferous band, north-westwards to Sybil Point; where the Old Red Sandstone of the Carboniferous System covers it unconformably, dipping N. W. 60°. From the signal tower on the conglomerate, across the strike of the brownstone, to the fossiliferous slaty band, is 60 chains, and this, with a dip of 70°, gives a thickness of brownstone here of 3600 feet. The section is well exposed on the coast near Sybil Head; but the bottom of it is not seen, being under the sea level. The geological position of this brownstone is fixed, by its being found conformable with, and under, the Silurian fossiliferous band.

At Clogher Head, farther south on the coast, a greenstone protrusion interferes with the continuity of the strata; but in the stream near Doonquin old churchyard, six miles west of Dingle, a fossiliferous slaty rock, similar to that at Ferriter's Cove, dips southward, and is covered by brownstone and brown slate, alternating with green grit and green slate to Slea Head—a distance of nearly two miles and three-quarters: all dipping at a steep angle southwards, and conformable. This, at an average dip of 70°, would give a thickness of about 14,000 feet of those grits and slates over the fossils at Doonquin,—all part of the same system.

I have just said that the fossiliferous band at Doonquin appears similar to that at Ferriter's Cove. They are separated by some grit beds, and a greenstone protrusion; but, nevertheless, they may be parts of the same original band, and accounted for thus:—In the diagram which I now exhibit, suppose the earth's surface at this locality, at one time, to have stood at a higher level, shown by the dotted line

ghi, than the present line from *a* to *f*. Then the fossiliferous band at *d*, represented by the white space *pmno*, was continuous; afterwards a fault on the line *hk* took place, and the portion between *g* and *h* slipped down to the position *abc*, and that part of the band between *m* and *n* was thrown down to *b*, and now makes, apparently, another band. Subsequently greenstone was protruded into the line of fault, between *c* and *k*, and that part of the surface between *h* and *i* was worn down by denudation to the present surface *cdef*.

Again, at Kinard, three miles S. E. of Dingle, the brown grits, and purple slates, at Coosathurrig, on the shore, contain Silurian fossils; the dip of the beds being S. 70° to 80°. This brownstone is surmounted, on the hill of Kinard, unconformably by a cap of Old Red Sandstone; the beds, on an average, lying nearly level, as stated before. This patch is of an oval form, a mile and a quarter long, in a N. E. direction, by a quarter of a mile wide. This locality affords a striking proof that the brownstone and the Old Red Sandstone are of two different formations, for I consider that the manifest unconformability of the beds of the two groups points out the true line of demarcation between the two systems, although both appear like Red Sandstone,—differing, however, in this circumstance, that the lower, besides the Silurian fossils, is more brownish, and very hard; the upper, more red and soft.

Pebbles of white vein quartz are frequently seen in the brownstone, along the coast, between the mouth of Dingle Harbour and Bull's Head; even in the vicinity of the Silurian fossiliferous band, and in the same group of strata, white quartz pebbles are also got occasionally in the green grits hereabouts—a circumstance worthy of noting, because it has been thought that those white pebbles are peculiar and characteristic of the Old Red Sandstone conglomerates, and not found in other rocks; but they do sometimes occur in brown and green Silurian grits, as in this instance.

Besides this cap of Old Red Sandstone at Kinard, there are several other places in the Dingle peninsula where the Old Red Sandstone conglomerate lies unconformably on the brownstone, or other coloured grits—I shall notice them separately:—

1. The first is at Sybil Head, a narrow strip of strong conglomerate, only a few yards wide, dipping N. W. at 60° into the ocean, as before stated, and covering the upturned ends of the brownstone beds unconformably along the shore for nearly a mile and a half in length.

2. On the east side of Smerwick Harbour it is visible at Ballydavid Head, forming also at this place a narrow band along the coast.

3. At Beenaman, in the townland of Ballinahow, skirting along the northern base of Brandon Mountain to Brandon Head, where it turns southward, and inland. These three strips, though separated by indentations in the coast, seem to be a continuation of the same band, composing the basal beds of the Old Red Sandstone, from Sybil Head to Brandon Head, a distance of ten miles. The rock is the same in lithological appearance in all those three patches, and in the magnificent coast view, looking from Beenaman towards Sybil Head, this band exhibits a remarkable uniformity of strike and dip the whole way.

4. Proceeding eastwards, the next in order is at Kinard, three miles S. E. of Dingle, which I have just described.

5. The conglomerate is visible on the summit of the hill at Hillville, four miles west of Castlegregory, forming a cap there also, in extent nearly a square mile.

6. At Gleenteenassig, four miles north of Aunascall, and eleven miles E. N. E. of Dingle, there is a remarkable precipice, above 100 feet high, called Foylenagreave, immediately west of Lough Slat, in which the conglomerate, above 60 feet thick, dips N. W. 25, overlying a brown, micaceous, flaggy grit rock, which dips N. W. 60°. This is a very wild, romantic spot, and though I did not examine the country westward of Lough Slat, I believe this conglomerate exists over a large area in this locality, not yet known, which would be well worthy the attention of a geologist.

7. The Hill of Doon, half a mile S. E. of Lough Slat, and four miles N. of Aunascall, has a cap of conglomerate a quarter of a mile in diameter, dipping N. about 30°, and lying on thick, strong, green grit beds, which are visible in the next stream eastwards, where they dip W. 60°.

8. On Cummeenhill, about a mile east of Doon, is another patch of the same rock, dipping the same way, and lying on green grits and slates, which have a dip of 60° W. This is well exposed in a high cliff, west of Loughacummeen. I believe this conglomerate exists eastwards, on the summit of the hills in the townlands of Maghasheela and Glanlough North, but did not examine the ground.

Here I may observe, that in Munster the Carboniferous formation exists to a great thickness between Tralee Bay and the Galtee

Mountains; but in the western part of this peninsula, it appears to have been nearly all carried away by denudation, leaving, as a memorial of its former existence, only the eight small patches I have just described, of its very lowest beds. Different from these, however, is the case that follows.

9. At Scrallaghbeg, farther eastward, another junction of conglomerate, overlying green grit unconformably, occurs. This is a few perches south of a sharp turn in the public road, seven miles N. E. of Aunascall, and ten miles from Tralee. The Old Red Sandstone at this place, is evidently of the lower beds, and a continuation of the several patches, Nos. 6, 7, 8, being in the same line, country, and having a similar dip. From this place it proceeds eastward, covering the northern slope of the hill for about three miles, where it turns southward to Bartregoum, the highest point of Slievemish Mountain. From this summit eastward, the whole mountain is covered with it sloping downwards gradually to the east for twelve miles, without much increase in thickness, till it comes near the coach-road from Tralee to Killarney, at Currens, where it is succeeded conformably by calcareous slate, containing a profusion of the ordinary fossils of the Carboniferous Limestone, and one of the best localities in Ireland for those fossils. This slate is again covered by the limestone about Castle Island, and that surmounted by millstone grit, the base of the coal rocks of the Slieve Luaghar Mountains.

Thus, this conglomerate of the Old Red Sandstone can be traced through the Dingle peninsula, in eight detached patches, from Sybil Head to the summit of Slievemish Mountain, and the overlying Red and Yellow Sandstone eastward along that mountain passes into the calcareous slate, limestone, and millstone grit of the great Munster coal district.

The section from Brandon Head to Bull's Head is the longest across the strike of the strata in this peninsula, and is instructive. At Brandon Head, on the north, the brownstone dips to the south, at an angle of about 70°. At Connor Hill, in the middle the rock is green and gray grit, and also dips south at about 60°. At Bull's Head, on the south shore, brownstone, associated with gray slate, dips southward at an angle of about 80°. In this line, from Brandon Head to Bull's Head, no fault has yet been detected, no protrusion of greenstone or other igneous substance; nothing apparent, that would disturb a regular succession of the rocks. There is even an

inference, that there is no doubling up or repetition of the strata, in the fact, that the fossiliferous band at Ferriter's Cove, composed as it is of greenish and gray slaty rocks, with abundance of *Catenipora escharoides*, is by its strike in the lower part of this section, and the fossiliferous band at Foyleathurrig, which has neither green nor gray slates, nor *Catenipora escharoides*, but brown slates and grits, and other species of fossils, is evidently in the upper part. Those two bands are not the two arms of a convolution; but one band near the base, and another near the top of a continuous unbroken section, which here is twelve miles from north to south, with an average dip of 70°, making a thickness of 59,500 feet, without seeing either the bottom or the top of the group. By the fossils alone, without reference to the thickness, this group, which consists of alternating bands of brownstone, and brown, red, and purple slates, green and gray grits, and green and gray slates, is all Silurian, without any doubt: and the overlying sandstone, with its band of conglomerate for a base, and its unconformable position, is the true Old Red Sandstone of the Carboniferous system, which, as was said before, passes in parallel beds and conformable succession, upwards into the mountain limestone.

Besides the Dingle peninsula, there are other brownstone districts in Ireland, some of which are intimately associated with strata containing Silurian fossils. I shall notice them separately, beginning in the north of Ireland, and proceeding southward as they occur upon the map.

1. The first is a region in the counties of Tyrone and Fermanagh, stretching in a south-west direction, between Pomeroy and Enniskillen. It is forty miles long, and nearly ten broad. It is intersected by many dykes of greenstone, and has numerous bosses of brown porphyry. The brownstone of this district consists of the following varieties:—First. A strong brown conglomerate, composed chiefly of pebbles of brown quartz rock, hard and semi-transparent at Lisnanick, on the north-west corner. Second. The chief part is composed of brown grit, near the south-east border. Third. Some softer slates and shales, apparently in the upper part, about Fintona and Trillick. A remarkable characteristic point in the grit beds here and elsewhere is, that they contain angular fragments of brown slate, of very fine grain, two to four inches long.

At the north-east end, near Pomeroy, the Silurian gray grits

and slates are surmounted by brownstone. Although no actual contact is got of the two rocks, yet a comparison being made of the dips, where the two are found nearest to each other, leads to the conclusion that they are conformable. Near the south-west angle of this region, at Lisbellaw, the fossiliferous Silurian gray grits and slates are covered by the brownstone conformably, both having the same strike and dip at their junction. The thickness of the brownstone is pretty well seen in the middle of the district, in the line of country between Clogher and Fintona. Proceeding along the road, about a mile from Clogher, it dips north-west, at an average angle of about 40°, and this is observed here and there for about two miles, and perhaps farther, for the country becomes covered with drift. With such dip, two miles of a country would give a thickness of 6780, or say 7000, feet. In the brownstone strata of the district, no fossils have been discovered; the examination made having been hasty and superficial. There are some beds of red limestone in the vicinity of Nine-mile House, on the north-east quarter, which are worthy of a closer search.

In the Tyrone district, along the south-east border, the brownstone lies below the Old Red Sandstone unconformably. It dips generally to the north-west, while the Old Red Sandstone, of which the lower part is red, and the upper part yellow, has a contrary dip, being to the south-east. This might be considered the top of an anticlinal line, the rock being sandstone at both sides; but it is not so. The brownstone, as just stated, is of great thickness, composed of brown grits, very hard, and dipping north-west 40°; while on the south-east of this, the band of sandstone is red near base, yellow near the top, all very soft, with some beds of black calcareous slate interstratified, and is immediately succeeded by carboniferous limestone. The whole band of sandstone being thin, and dipping at a low angle, shows that it is not a counterpart of the hard, brown, thick-bedded group, just described, and, therefore, not an anticlinal line.

2. The second brownstone district is that of the Curlew Mountains, in the northern part of Roscommon, and extending westwards into Mayo—a narrow band of about thirty miles long, by five or six miles wide. At the east end, near Keadue, green grits and slates occur; and at Uggool, at the other end, five miles north-west of Ballaghaderreen, gray grits, limestones, and slates occur, abound-

ing in Silurian fossils; but the relation of these with the brownstone strata cannot be determined, as there are numerous protrusions of porphyritic rocks, which interrupt the succession. Similarly with the Tyrone district, the Old Red Sandstone and limestone at Boyle, and at Ballaghaderreen, lie unconformably on the brownstone, along its southern border.

3. About Castlebar, ordinary Old Red Sandstone is abundant. So far as physical aspect goes—that is, brown colour and excessive hardness—there is a district north-west of this town, lying between Lough Conn and Newport, which I would put in the brownstone division. I have not had opportunity, however, to work up this district, either for succession or fossils, by any more than a slight examination. A small district of similar character occurs on the south side of Clew Bay, and west of Louisburg.

4. The Killery Harbour district comes next. It is situated in the county of Galway. On the road from Clifden to Westport, at Blackwater Bridge, three miles south of Killery Harbour, a succession of strong conglomerates, gray grits, and gray slates, containing an abundance of Silurian fossils, lie unconformably upon strata composed of mica slate, with alternating groups of gray crystalline limestone and quartz rock, all without fossils; and, what is remarkable here is, that, in general, a band of brownstone forms the base of the Silurian district. This band varies from 200 to 300 feet in thickness and is surmounted by gray and green grits, and slates, which abound in Silurian fossils, with accompanying bands of coarse conglomerates. The district extends, on the south side of Killery Harbour from the ocean eastwards, in irregular form, to Lough Mask and Lough Corrib, and in all the middle and eastern parts the brownstone band forms a conspicuous base, and generally an index to any locality where fossils may be expected, as the fossiliferous beds overlie it immediately. I may add that, in this district, as well as at Dingle, there is an enormous thickness of green and gray grits and slates, amounting to many thousand feet, over the principal fossiliferous band near Blackwater Bridge just alluded to. The beds of rock in general dip and accumulate from this locality to the north-east towards Toormakeady, on the west side of Lough Mask; and then, as if to tie all this mass of strata into one great parcel, a thin band of limestone occurs, near the top at Glensaul, in which Silurian fossils have been found,—this being a parallel case with the Brandon Head section, already described.

5. The next in order is the Dingle district, into which I have entered already; and will only repeat that the band of brownstone at Sybil Head, below the fossils, is 3600 feet in thickness, not including the bottom beds, which are under the sea; and that between Clogher and Fintona, in the county of Tyrone, the brownstone rock is at least 7000 feet thick, without the lower beds also, which are not visible there.

Those numbers go pretty far as an approximation to the thickness of the Old Red Sandstone of Scotland and England, with, however, the important difference, that the British rocks are considered as Old Red Sandstone. The Irish equivalents—if equivalents they be—are undoubtedly Silurian.

In the south of Ireland there are also other tracts of brownstone, besides that in the vicinity of Dingle. They occur in some of the highest mountains in the country; for instance, Macgillicuddy's Reeks, Torc, Mangerton, the Priest's Leap, and other mountains in Kerry. In Cork are the Paps, the Boggra Mountains, Mount Hilary, Knockoura, and so on to the Knockmeldown and Cummeragh Mountains, in Tipperary and Waterford.

The two localities, Dingle and Killery Harbour, are 200 miles asunder; and yet hand specimens of slate or grit, or specimens in the rock, abound in both, which for hardness, grain, or colour, could not be known asunder; and I may include with those, as having the same lithological character, Macgillicuddy's Reeks, and the other mountains of Kerry, Cork, and Waterford, already enumerated. In those lofty ranges, the association of the brownstone with green and gray grits, and gray, red, and purple slates, is of frequent occurrence, and requires some notice. In the grit beds, though they compose the chief volume of the mountain masses, no fossils have yet been discovered.

Since fossils have become indicative of the age of groups of rocks, attention appears to have been drawn away from their lithological character. This, however, is not to be rejected; and it is particularly useful where no fossils are found. It is not easy to give a description in writing of a rock specimen, so as to be generally understood; but I may say, that I would know even a hand specimen of the green grit of the Killarney Mountains, or the brownstone of Sybil Head, if I saw them or their equivalents at Londonderry, or anywhere else; and I think an experienced eye

will be seldom wrong in recognising a group of rocks from their stony characters.

I have already described the Brandon Head section, and shown it to be Silurian; and I consider, as I have just said, the rocks of that section to be identical, in external character, with the rocks of many of the mountain ranges of Kerry, Cork, and Waterford; but, to show some of my reasons for so thinking more fully, I must go a little into detail. Alternations similar in character and colour with those in the Brandon Head section are observed about Derrycunnihy, near the tunnel, on the road from Killarney to Kenmare, where bands of rock, brown and green, are crossed in travelling. So it is in the Boggra Mountains; a section occurs in the Fermoyle river, on the roadside from Kanturk to Cork, where alternate bands of green and brown grits and slates are found in succession.

The cuttings in the railway from Mallow to Cork give a similar result, on the great scale; and on a smaller, I found the following succession in a piece of cutting, in the townland of Carrigduff, three miles south of Mallow, where every man may study it for himself. Beginning at the bridge, which is on the southern boundary of the townland, it is as follows, proceeding northwards:—

From the bridge to entering the cutting, ...	40 yards.
Brown slate, ...	15 „
Green flaggy grit, ...	1 „
Brown, ...	5 „
Green, ...	5 „
Brown, ...	3 „
Green, ...	1 „
Brown, ...	1 „
Green, ...	8 „
Pass 147½ miles post.	
Brown, with green spots, ...	19 „
Green, ...	8 „
Brown, ...	4 „
Green, ...	4 „
Brown, ...	3 „
Green, ...	4 „
Brown slate, ...	6 „

At this place a fault occurs, having brown slate on the south side, and green grit on the north.

Green grit,	3	yards.
Brown,	6	,,
Green,	8	,,
Brown,	5	,,
Green grit,	5	,,
Brown,	4	,,
Green thick beds of grit,	5	,,
Brown,	9	,,
Green, gray, and brown, confused,	2	,,
Brown,	8	,,
Green,	9	,,
Brown slate, including three yards of brown grit,	26	,,
Green,	14	,,
Brown,	25	,,
Green,	1	,,
Brown,	1	,,
Green,	13	,,
Brown,	21	,,
Green,	11	,,
Brown,	1	,,
Green,	1	,,
Brown,	3	,,
Green,	3	,,
Brown rock ends,	71	,,

Cutting ends at 400 yards from the bridge.

Thus we find in this section of 360 yards in length, twenty bands of brown grits and slates, and nineteen bands of gray and green colour alternating with them; so that the colour of those gray, green, and brown grits and slates goes for nothing as an argument to prove the age of the rock.

Many other sections interesting on this part of the subject occur in the country. There is one in a quarry at Commons, half a mile north of Cork, on the Blarney roadside, worthy of a visit, and a fine section in the railway cutting at Rathpeacon, two miles north of Cork, in which the alternation of green and brown colours are visible, as well as occasional examples of a bed, or a band of rocks, being of the one colour near the surface, and passing into the other below, where the strata stand nearly on edge.

Regarding the section just described at Carrickduff, and the whole group of ten or twelve miles of the same kinds of rock from that to Cork, it may be argued that as no fossils have been found in them, their geological position is doubtful, and they may belong to any formation; but though the proof by fossils has not yet been made out here, as it is seen in the Dingle peninsula, yet a part of the proof which is observable in the western district occurs here also; that is, the unconformability between the beds of the Carboniferous formation, and the underlying green and brown grits. At Quartertown Upper, one mile and a half south of the town of Mallow, in the railway cutting, the brownstone rock is seen in gentle undulations, having a low general dip eastwards, and noticed at the junction No. 67 in the Table; and the Old Red Sandstone at this place lies on it unconformably, having a dip northwards towards Mallow, where it is soon covered by the mountain limestone and coal rocks in the vicinity of that town.

At the time the formation of the railway was in operation, this junction was pretty well exposed, but at present it is not so; the dressing of the slopes obscured it, but still the hard brown grit may be seen south of the junction, and the soft red and yellow sandstones north of it. I may observe of the locality that there was a stream of water which came in from the east, conveyed in a small trough over the railway, exactly at this junction. The unconformability here I take as conclusive that the rocks on both sides of the junction, that is, the limestone at Mallow, and the brown grits at Quartertown, belong to two different geological epochs.

In this place I will say a few words on the Yellow Sandstone of the south. I have already stated that in the Old Red, in the north of Ireland, the prevailing colour is red, and the volume thick. In the south the yellow colour predominates, and the volume is much diminished. At Muckross, near Killarney, and at Quartertown, near Mallow, it appears to have dwindled to a very thin band, but still true to the type. The rock is soft sandstone, and not hard grit. To the south of these two last-mentioned places I do not know of its existence anywhere in Kerry or Cork,—keeping in view the type, as seen near Hook Head, or anywhere northward, in Clare, Galway, or Tipperary, Tyrone, or Down.

I know that the remains of plants are got at Cork, in one bed

of a grayish-white sandstone, which bed, two or three feet thick, I believe is in the brownstone strata; and I have seen plant remains in a similar bed, and in a similar geological position, at Knockahavaun, two miles N. E. of Dungarvan. We had also some of the same kinds exhibited here last year, by Dr. Griffith, from Tallow Bridge, to illustrate his paper on the Yellow Sandstone, which the Society may remember; but neither the sandstone nor the plants are like those that occur in the Carboniferous rocks,—the Lepidodendrons and Calamites being of a stunted growth, and different species. Professor Rogers produced specimens of plant remains at the last meeting of the British Association, at Glasgow, identical with those got at Tallow Bridge; and he put them forward as having been found in some of the Silurian rocks of America, and exhibited them as geological curiosities, plants of Silurian age.

I have thus endeavoured to show, that in our Irish Palæozoic rocks there are two old sandstones which belong to two distinct eras in the history of the earth,—the first, being the lower and the older, is of a brown or reddish-brown colour, and is composed both of grits and slates, the grits very hard, and the slates having a strong cleavage. Moreover, that in the south and west of Ireland, where those rocks are pretty fully developed, the brown and red grits and slates alternate with green and gray grits and slates of the same age; that in Kerry, those rocks amount in one section to above eleven miles in direct thickness, without the upper or lower beds, which are invisible; that they include bands teeming with fossils of the Silurian age, and that the beds usually dip at a very steep angle, except in the tops or bottoms of some of the great convolutions which occur occasionally in parts of the country;—that the second or upper part of those sandstones is that band which forms the base of the Carboniferous rocks; it is more red, more soft, and thinner, its average thickness being about one thousand feet. It contains no green or gray grits or slates, and very seldom exhibits cleavage in its shales, only lines of lamination: the beds generally lie flat, or nearly so, and these are features affording some points of contrast when compared with the older rocks.

The Devonian rocks are said to constitute a passage, or gradual change, from the Silurian into the Carboniferous formation, and to partake of the nature of both, in fossils, as well as in rocks. I have given a list of seventy-eight localities, any of which may be visited —and stated that I know many more where the Old Red Sandstone

lies unconformably on the inferior rocks, and not one case do I know in Ireland where they are conformable. The base of the Old Red, therefore, forms an abrupt, distinct boundary line between the two. All the rocks in the vicinity of this line are resolvable into either the group above it, or the rocks below. I hope, therefore, I have made clear the conviction that is on my own mind, that there is no passage, or gradual change, between the lower and the upper system, and consequently no Devonian rocks in Ireland. I know that the reverse of this statement has been put forward years ago in this Society, and reiterated many times since. Even last year a paper was read here, stating that the brown grits of Dingle are Devonian; but I look upon this as without foundation. Any grits, or slates, that lie between two bands of Silurian fossils, the whole being conformable, should be classed with Silurian rocks, as well as the sandstones and shales lying between two beds of coal, should be put into the coal series.

Indeed, it appears quite impossible to reconcile the Devonian system, as tabulated by Sir Charles Lyell, at p. 365 of his Manual, with the appearances presented in Ireland, and no doubt this is the best authority now extant. In this work the Carboniferous formation consists of only two members,—the coal series, and the mountain limestone. The Old Red Sandstone, which forms a natural division of the formation, is cut away, and classed with lower rocks, thus:—

Upper Devonian.

a. Yellow sandstone of Dura Denn, Fife.

b. Red sandstone and marl, with cornstone of Herefordshire and Forfarshire.

Paving and roofing stone, Forfarshire.

Upper part of Devonian beds of South Devon.

Lower Devonian.

Gray sandstone, with Ichthyolites, Caithness, Cromarty, and Orkney; lower part of Devonian beds of South Devon, and green chloritic slates of Cornwall; limestone of Gerolstein, Eifel.

Under these are the Silurian rocks, comprising the tilestone of Brecon, the Ludlow and Wenlock limestones and shales, the Caradoc sandstone, and Llandeilo flags.

The first member of the system, the yellow sandstone of Dura Denn, is the equivalent of the Irish Old Red, or, at least, of the upper part of it. It appears to me that this ought not to be separated from the Carboniferous formation; the three subdivisions of which, as already enumerated, from the general parallelism of their beds, were undoubtedly deposited in one geological era, and a comparatively calm one it was. Abundant proofs exist of tremendous disturbances previously in the upturned edges of all the lower rocks, and subsequently in the contortions of the strata of the formation itself, where they are not broken up by faults; for, even in those contortions, the beds of sandstone, limestone, shale, and coal, are alway parallel to each other through every undulation and inclination. Besides this, certain fossils are common to the whole three subdivisions. I saw in Professor Haughton's cabinet, in Trinity College, some specimens procured from the yellow sandstone, or upper part of the Old Red, at Porter's-gate, near Hook Head, in Wexford. Among them were *Orthis crenistria*, *Atrypa pleurodon*, *Producta caperata*, *Producta concinna*, *Producta setosa*, *Sanguinolites sulcatus*, *Lithodomus dactyloides*, and others, all mountain limestone fossils. Again, in the county of Tyrone, in the river near Cookstown, and about twenty chains below Kildress Bridge, specimens were obtained by Colonel Portlock, from Red Sandstone. The bed which contains them is near the base of the Old Red in that locality. Those specimens are in the collection of the Geological Survey, in the Museum of Irish Industry, Stephen's-green. They are very fossiliferous; and among them are found *Producta Martini*, *Producta setosa*, *Orthis umbraculum*, *Orthis crenistria*, *Atrypa pleurodon*, and others; all common in the mountain limestone.

Neither are the coal rocks without similar fossils. At Carrownanalt, two miles N. E. of Keadue, I found in a ravine in the coal-measures thirty-five species of shells and Trilobites, in a few blackish calcareous beds, altogether about three feet thick. This fossiliferous band is about 200 feet over a bed of coal, which has been worked in the vicinity. Of the thirty-five species, twenty-six occur in the mountain limestone, and are, therefore, common to both.

This double link, the parallelism of the beds, and the community of the fossils, is against the Old Red being separated from the Carboniferous rocks, and joined to other inferior rocks, with which, in Ireland at least, they have no relation but contact.

In the lower Devonian, as given in the Table, the gray sandstones of Caithness, and the green chloritic schists of Cornwall, are of a colour and kind that I never saw in the Old Red Sandstone of Ireland.

It is much to be regretted that Sir C. Lyell has not supplied even an ideal cut to show how he joins the Old Red Sandstone to the underlying rocks. Such a cut would show something relating to the conformability of the groups, which the verbal Table does not express.

In the diagram, which I exhibit, let the upper part with horizontal strata represent the Carboniferous formation, with its three subdivisions—coal, limestone, and red sandstone; and let AB be the base of the latter, the conglomerate bed, laid unconformably on the inclined ends of the underlying strata, as a foundation. Those strata, as I have shown, are of many kinds. In the seventy-eight localities I have pointed out, the conglomerate lies on fourteen different kinds of older rocks. Let *a* represent granite; *b*, stratified quartz rock; *c*, mica slate; *d*, primary crystalline limestone; *e*, greenstone; *f*, amorphous quartz rock; *g*, gray clay slate; *h*, gray grit; *i*, red clay slate; *k*, green grit; *l*, green chloritic slate; *m*, brownstone.

Now cut away the Old Red Sandstone from the Carboniferous formation, and let it go to the underlying rocks; then take of these rocks a horizontal band 1000 feet in thickness, to represent the remainder of the Devonian. It is plain, then, that in Ireland this formation will be represented by its upper part, the Old Red; and below, by portions of all those other older rocks; and, therefore, that all the older stratified rocks in Ireland take a share in the Devonian system, as well as some of the igneous.

This is my view of the Devonian system. Had it been composed of a regular succession of rocks, lying together like the Silurian system, or like the Carboniferous formation, there would be no doubt about it; but to make it good, instead of working it out in Devon, its own country, one of the most profound geologists found it necessary to ransack Europe, to get suitable parts to make it up; and it appears to me that Sir Charles Lyell undertook no easy task when he took a limb from Dura Denn, a joint from the cornstones of Herefordshire, an arm from the green chloritic slates of Cornwall, a leg from the gray sandstones of Cromarty, and a part from

the Eifel limestone; and endeavoured to join those distant fragments together, and make out of them a consistent whole.

At the meeting of the British Association at Glasgow, last September, in one of the geological discussions, Professor Sedgwick said that the Devonian has no base. In this assertion, I believe, he cannot be contradicted. No estimate has ever been attempted to be made of its thickness,—nor ever can be, as it appears to me.

I would not have thought it necessary to notice the brownstone as I have done in this Paper, any more than the green and gray rocks with which it is associated, only for the circumstance, that it appears to have been mistaken for the Old Red Sandstone of the Carboniferous system,—there having been no distinction drawn between them; and that a considerable amount of confusion has crept into the classification of rocks, in consequence of this mistake. I have taken pains to describe both kinds, and to point out the difference between them; and I hope my observations may be useful to others who may have better opportunities of prosecuting the inquiry, with a view to settle this important question.

OBSERVATION ON SOME OF THE JUNCTIONS ENUMERATED IN THE TABLE OF LOCALITIES.

1. The junction at Conaghra, five miles W. of Ballycastle, in Mayo. Though the dip of the stratified quartz rock on the coast here, and the dip of the Old Red Sandstone, are both eastward, and not far from the same angle; yet, on close inspection, it will be observed that the lowest bed of sandstone covers over the ends of several beds of the quartz rock; and, as it proceeds south, mounts over the mica slate also, which there overlies the quartz rock beds conformably.

2. Near Bangor, on the road side, there is a good section of the Old Red Sandstone, showing its whole thickness at that place, and the transition into the black slates and thin limestones which lie over it here, and which abound in mud fossils, Nuculæ, Modiolæ, &c.

6. At Ballaghaderreen, the rock which underlies the sandstone is a brown slaty porphyry, which shows traces of a dip to the north. This porphyry fills a flat district four or five miles to the N. W., where it is succeeded by the Silurian fossiliferous slates of Uggool.

12. At Drung the Old Red Sandstone runs out at the shore to low water.

17. At Seegronan the inferior rocks abound with bands of crystalline limestone, interstratified with mica slate. The marble is striped, white and gray mixed; and some of it a beautiful salmon colour.

21. A good section of the Old Red Sandstone is visible in the river running through Kildress, from Orritor to Cookstown. Peculiar fossils are got in a bed of Red Sandstone near the base of it. *Atrypa sublobata*, and two or three other small shells, occur in it. A band of red limestone, accompanied with red shale, is seen in the river bank, which has been quarried for use, and contains some of the usual fossils of the limestone.

22. At Latbeg, near Clogher, in ascending the high ground northwards, the beds of brownstone dip to the N. W., at an angle of 40° to 50°, and accumulate in that direction for about two miles, showing a great thickness of this brown grit. The rock in the valley dips at a lower angle, in an opposite direction; and, as both are sandstones, the anticlinal might be supposed the top of a convolution; but this is not the case, as, if so, the rock dipping to the south would be brownstone, the same in lithological character as that which dips N. W., which it is not. It is a whitish or yellowish thin bedded flag, with alternations of black shale.

23. The Old Red Sandstone at Gortnagross, near Cushendall, lies on mica slate, and its lower conglomerates are formed of rounded pebbles and fragments from that rock,—with little else.

27. At Drummanbeg, three miles N. N. E. of the town of Armagh, in the large quarry whence was got sandstone to repair the church, I got a fish-tooth, which resembled a Plectrodus, but was much larger than those figured in the Silurian system, being above half an inch in length.

30. The Red Sandstone at Kilcurry seems but thin, as the limestone appears not far from its base; but situated as it is, in the vicinity of metamorphic and porphyritic rocks, there may be a fault, in which part of the sandstone is buried.

33. The strong green grit is well seen at Drumany, near Killeshandra. On the road side the nearest sandstone lies N. W., nearly half a mile off in the flat land of Portlongfield, and lies nearly level; it is of a yellowish-white colour, and contains a few large rounded quartz pebbles.

35. At Portrane Pier there is only a small part, about five yards

long, of one bed of coarse red conglomerate, visible over the gravel on the shore. It rests on the Pier, which is greenstone, with veins of calcareous spar. Immediately south of this a black shale occurs, with rounded masses of gray limestone, and in one of those nodules the *Orthis reversa* was got, which Mr. Salter described and figured for Mr. Griffith's Synopsis of the Silurian fossils. Greenstone, as here, often makes its appearance in the boundary between the Silurian and Carboniferous systems.

38. At Grangeclare the Old Red Sandstone is but a small patch lying on the south flank of the Dunmurry range of clay slate hills, which are probably Silurian, from the proximity of the Chair of Kildare, a hill of light gray limestone, with some associated black and red slate, abounding in Silurian fossils.

43. At Cornagha, near Boyle, and along the south flank of the Curlew Mountains, the brownstone dips north, at a low angle, about 10°. At Ballinphuil the yellow part of the Old Red Sandstone is visible, and dips S. 7°. These two observations are farther asunder than I would be inclined to adopt, were it not that both rocks are remarkably steady and regular in the dip for a good space around; as at No. 22, both rocks being sandstone, this difference of dip might be considered a slight anticlinal axis in the one system; but the arm to the north is a hard brown quartzose grit, remarkably uniform in physical appearance, and the beds accumulate to a large amount, while that to the south is a soft whitish sandstone, at Termon immediately surmounted by limestone, showing that the two sides of the axis belong to two different systems.

45. At Derrylaura, near Oughterard, the underlying rock is granite, which here shows itself between the Old Red Sandstone and a Silurian dark gray slaty grit, very fossiliferous.

46. At Cregganore, near Loughrea, the base of the Old Red Sandstone is seen in one of the clearest junctions in Ireland. Here are several patches of the lowest bed of the conglomerate, seen lying horizontally on the black slate, which dips at a steep angle. The calcareous slate, which lies over it, is visible also in a stream a little below on the side of the hill, thus showing the whole thickness of the sandstone, which here is unusually small. This locality is known for miles around by the name of Toberelathan, or St. Elathan's Well.

62. At Kinard, near Dingle, on the hill, level beds of soft Red Sandstone lie on the edges of vertical beds of brown hard grit, in

which some beds of purple slate are interstratified; and this slate contains Silurian fossils. They are got in the cliffs on the shore, in some accessible spots; and about high-water mark, some beds of reddish limestone show marks of them also. In the Red Sandstone, on the top of the hill, is a remarkable mass of white quartz, forming a crest, which at a distance resembles an old castle.

63. At Glenteenassig, in the Dingle district also, immediately west of Loughnascall, is a magnificent exhibition of the lower conglomerate, in a precipice above 100 feet high, lying on the upturned edges of the beds of a brown micaceous flaggy grit, belonging to the lower formation, as at Kinard. The conglomerate here is about 80 feet thick. The strike of the two rocks is nearly the same; but the lower dips N. W., at an angle of 65°, while the upper dips at an angle of 25°. To the geological tourist this place is well worth a visit.

64. Doon Hill, near the latter locality, has a cap of conglomerate dipping N. W. about 30°. The junction with the underlying rock is not visible. The nearest part of it to the place is seen in stream a little eastward, where very thick beds of a chloritic greenish gray grit rock are visible, dipping W. at an angle of 65°.

67. At Quartertown upper, near Mallow, there is a junction of the brownstone and Old Red Sandstone. It was exposed when the railroad was in progress of being made; but since has been much obscured by what the engineers call "soiling the slopes." The brownstone south of this junction presents the usual physical aspect it does in the south of Ireland, hard and strong-bedded, the beds a little undulating, with an average dip S. E. The Old Red, which dips N. E., or towards Mallow, at about 20°, consists of a soft red rock below, succeeded by a little bluish gray shale containing *Modiola cypricardia*, &c., and over this a yellow sandstone which disappears northward under the drift.

68. At Waterford, and its vicinity, the lower beds of the Old Red Sandstone are well exposed on the hill at Newrath, as well as on the west side of the river, opposite the railway station. The unconformability here is very clear. Proceeding northwards from this place by Mullinavat, the conglomerate is succeeded by red beds, which, towards Thomastown in the upper part, as usual, are yellow, and covered there by the limestone of Kilkenny. At Kiltorkan, near Ballyhale in this line, are a few beds of very fine-grained yellow rock,

in which remains of plants and shells have been discovered and made known by the persons employed on the Geological Survey.

72. At Rocksborough, near Wexford, the lower beds of conglomerate were visible at a farm-house on the roadside; but recently a new road has been made close by the house, and the rock thereby concealed, or quarried away. It lies here on yellow massive quartz rock, which has obscure joints of cleavage, or of bedding, dipping towards the north-west; the lines are nearly obliterated.

77. At Templetown, on the shore, is a clear, well-exposed section of the Old Red Sandstone, lying on gray slate, which, from the junction towards Duncannon, is very much contorted. The sandstone here has a pretty regular dip southward, averaging about 12°. Near its southern termination in a little bay are thin beds of limestone, with black shale, and full of fossils; and over this again a thin band of yellow sandstone. Then come the shales and limestone, which continue to Hook Head. This I consider one of the most complete typical sections, and the best exposed in Ireland, of the Old Red Sandstone and limestone.

The Society met on the 14th of May, 1856, on which occasion the following Paper was read.

ON THE LOWER CARBONIFEROUS BEDS OF THE PENINSULA OF HOOK, COUNTY OF WEXFORD. BY THE REV. SAMUEL HAUGHTON, M. A., PROFESSOR OF GEOLOGY IN THE UNIVERSITY OF DUBLIN.

The parish of Hook, county of Wexford, is well known to afford one of the best sections of the lower Carboniferous beds in the south of Ireland; and as no detailed account of it has been published, I have put my notes together, and endeavoured to lay them in a connected form before the Society. From the fact of the strike of the beds running across the peninsula, an opportunity is afforded of studying them at both sides, in the Waterford Harbour and on the sea-side; and it is not difficult to obtain an approximate value of the thickness of each deposit.

There is an uninterrupted series of conformable deposits, extending from the Old Red Sandstone conglomerate on the north, to the Carboniferous Limestone of Hook Light-house on the south, unbroken,

save by a few unimportant faults, which do not prevent a correct estimate being formed of the thickness of the entire series. The beds are conformable throughout, and admit of being divided into five distinct groups, which I propose to describe in succession, commencing with the oldest beds of red conglomerate, which rest on the Silurian slates unconformably.

1. OLD RED SANDSTONE AND CONGLOMERATE.

The Old Red Sandstone and conglomerate of this district rest unconformably on the nearly vertical beds of Silurian slates, the line of junction extending in nearly a straight line from Carnivan Head on the east, to a point half-way between Harryloch and Templetown church on the west. The nature of the junction between the conglomerate and slate is well shown in the face of the cliff at Carnivan Head.

The beds of slate are nearly vertical, and the Red Sandstone and conglomerate beds are inclined at an angle of 10° to the horizon. I propose to place, provisionally, the uppermost limit of these beds at a line drawn from the rocks north of Sandeel Bay on the east, to the boundary of the townlands of Templetown and Houseland on the harbour, or west side. My reasons for fixing on this boundary will be explained in the next section. Within the limits I have assigned, the rocks consist of slightly inclined beds of massive red conglomerate, alternating with layers of red sandstone and red shale. They are quite destitute of fossils; and may be considered as typical beds of the Old Red Sandstone of the south-east of Ireland. I have measured the thickness of these beds in a variety of ways, and estimate it at 1150 feet. The sea must have been shallow during the deposition of these beds, as it is not possible to conceive any action save that of coast waves capable of forming such masses of rolled shingle, alternating as it does with sands and mud, tinged with peroxide of iron, evidently introduced by currents of a less violent character than those which laid down the rolled shingle of the sea beaches, which formed the materials out of which the red sandstone conglomerate was elaborated.

2. PLANT BEDS.

The uppermost portion of the sandstones and conglomerates consists of alternating beds of red conglomerate, red micaceous sand-

stones, and coarse red shale, succeeded conformably by gray micaceous sandstones, gray conglomerate, and dark gray shale, with yellow and white sandstones alternating with reddish argillaceous sandstones,—the entire series being characterized by the presence of imperfectly preserved remains of plants, which invariably occur in the gray and white micaceous layers of sandstone, and never in the red sandstone and shales which alternate with them. In one locality on the western side, these remains become so numerous as to constitute thin seams of anthracite, from one to two inches in thickness. The fossil plants, although very imperfectly preserved, present a general resemblance to the forms of fossil plants found at Tallowbridge, in beds of similar age, some of which were figured by me in my account of the fossil plants of the lower Carboniferous period. Some of the most common of the Hook plants are figured in the annexed Plates.

Figure 1 represents the imperfectly preserved exterior of *Knorria dichotoma*, in which the spiral arrangement of the leaflets is traceable, although almost obliterated.

Figures 2 and 4 represent natural casts of the interior of the same plant; and figure 3, a cross section of same, showing the existence of a central axis, as in *Stigmaria*. The central axis was connected with the outer stem by a remarkable series of spirally arranged woody spiculæ, which are shown in figures 2 and 4.

Figures 5 and 6 show smaller branches of the same plant; in these, however, the spiral arrangement of the leaflets is not visible; and it is possible they may be the remains of a distinct form.

The total thickness of these plant beds is 382 feet. The gray and yellow sandstones which contain the plant remains were evidently brought from a quarter different from that which supplied the red sandstones and occasional conglomerate beds which are found with the plant beds. We may suppose these vegetable remains to have been brought from a distance, and deposited with the red sandstones in a sea which was probably growing deeper, and which ultimately became the receptacle of exclusively marine remains.

3. OLDER LIMESTONE.

We find the plant sandstones just described succeeded by a thick series (851 feet) of alternating beds of arenaceous limestone, black

shale and sandstone, with red ochreous limestone, followed by flaggy limestones, sufficiently pure to be used for agricultural purposes.

A very remarkable series of beds, consisting of calcareous sandstone passing into limestone, and decomposing into a soft pulverulent mass, full of fossils, immediately succeeds the plant sandstones. In this group of beds, which is about 180 feet in thickness, a peculiar group of fossils, of which some are undescribed, occurs. Two of the most remarkable are figured in Plate II.

Figure 7, *Modiola Woarwoyensis*.—This modiola resembles in some respects the common carboniferous fossil, called *Lithodomus dactyloides* by Professor M'Coy; but is of smaller dimensions, and characterized by fine, well-marked, longitudinal lines radiating from the umbones, but not reaching to the margin. The lines of growth are well shown. I have called it Woarwoyensis, from the name of the locality, where it is found in abundance, and was first discovered by me, viz., Woarwoy Bay.

Length = 1·33 in.
Breadth (anterior) = 0·49 ,,
,, (posterior) = 0·52 ,,

Figure 8, *Sanguinolites Woarwoyensis*.—This species in some respects resembles the *S. sulcatus* of Phillips, to which it is allied. Posteriorly, the ridges are as well marked as in *S. sulcatus;* but the bifurcation is much less distinct, and the species is considerably smaller.

Length = 0·45 in.
Breadth = 1·07 ,,

The beds in which these fossils occur are characterized by a well-marked group of fossil remains, which occupy a definite position immediately above the plant sandstones. The following are the most abundant of the species:—

Orthis crenistria.
Atrypa fallax.
Reticularia (*Sp.*)
Productus caperatus.
P. antiquatus.
Modiola Woarwoyensis.
Sanguinolites Woarwoyensis.
Actinocrinus (*Sp.*)

The beds just described are succeeded by thick beds of yellowish

sandy limstones, alternating with gray flaggy sandstones and shales, which are literally covered with fragments of fishes' teeth; and these beds are again succeeded by others containing abundant casts of fucoids. The total thickness of the fish teeth and fucoid beds is 71 feet.

The remainder of the older limestone beds of this district which underlie the dolomite beds, are composed of flaggy limestones, with black shaly partings, and alternating layers of blue shaly limestone.

The total thickness of the series, including the two groups already mentioned, is 851 feet. About the middle of the series, a band of fine shaly limestone occurs, under Loftus Hall, which contains an extraordinary abundance of two varieties of Carboniferous Trilobites, viz., *Phillipsia gemmulifera* and *P. quadriserialis.*

The entire group is terminated on the south, and overlaid by a band of dolomite limestone, extending from the rocks at the south point of Patrick's Bay on the east to a point about 300 yards S. W. of Duffin's Well on the west or harbour side.

The older limestone, like the newer limestone which lies above the dolomite, is marked by a profusion of fine fossils, of which the commonest are—

Fenestellidæ.
Milleporidæ.
Favosites megastoma.
Lithodendron pauciradiale.
Syringopora geniculata.

Spirifer clathratus.
,, attenuatus.
,, plebeius.
Leptæna analoga.

Orthis filiaria.
O. crenistria.
Athyris concentrica.
A. squamosa.

*Orthoceras attenuatum.
*Euomphalus pentangulatus.
*Pileopsis vetusta.
*P. tubifer.

*Phillipsia gemmulifera.
*P. quadriserialis.

The fossils marked with an asterisk were not found in the limestone above the dolomite, and appear to indicate a shallower sea than that which subsequently existed.

We may suppose that the depth of the water, during the deposition of these beds of flaggy limestone and calcareous sandstone, was greater than during the period of the plant beds, or Old Red conglomerate; but the presence of such fossils as Trilobites, Modiola,

&c., leads us to conjecture that the depth of the water was moderate, probably not exceeding 70 feet.

4. DOLOMITE BEDS.

The limestone beds of the Hook peninsula are divided into two nearly equal portions by a very remarkable band of dolomite, quite unfossiliferous, or presenting only traces of nearly obliterated fossils, with some obscure remains, which are either casts of fucoids or of annelid burrows. I estimate the thickness of this belt of magnesian limestone at 385 feet; it is conformable, both above and below, to the flaggy limestone which preceded and followed it. I think it probable that this band of dolomite corresponds with the lower magnesian band described by Mr. Wyley in his account of the lower Carboniferous limestone of Kilkenny and Carlow.* It resembles it in physical characters, in the absence of fossils, although interposed between limestone beds remarkably fossiliferous; and it occupies the same geological horizon,—Mr. Wyley's dolomite lying 1100 feet above the base of the lower Carboniferous limestone, and the dolomite of Hook being about 900 feet above the uppermost plant beds of the Yellow Sandstone series. They are also comparable in point of thickness, the dolomite of Kilkenny being 200 feet thick, and the Hook dolomite 380 feet.

5. NEWER LIMESTONE BEDS.

The beds of limestone which rest conformably on the dolomite, and extend southwards to Hook Lighthouse, are 981 feet thick; they resemble closely the upper beds which underly the dolomite, and are composed of flaggy limestone, with alternations of black calcareous shale, the unequal weathering of which gives rise to a fine development of beautiful fossils on the exposed surface of the thin-bedded limestones. A remarkable series of limestones, containing fish teeth and spines of large size, of the genera Psammodus and Ctenacanthus, accompanied by myriads of *Orthis filiaria*, rests upon the dolomite, and occasional fine specimens are found throughout the entire series; the large size of the fish teeth, and their perfect preservation, coupled with other circumstances, lead us to believe that the water, which had been gradually deepening from the period

* Geol. Soc. Dub. Journal, vol. vi., p. 109.

of the deposition of the red conglomerate, had now reached its greatest depth, and had become the residence of creatures accustomed to provide their food in regions of the ocean remote from land. The following list, although far from perfect, contains the most common forms of fossil remains found in the limestone beds above the dolomite:—

Turbinolia fungites.
Favosites megastoma.
Fenestellidæ.

Palæechinus ellipticus.
Actinocrinus triakontadactylus.
Poteriocrinus punctatus.

Psammodus porosus.
Ctenacanthus.

Cyrtia laminosa.
Athyris concentrica.
Athyris squamosa.
Spirifer speciosus.
Sp. clathratus.
Productus Scoticus.
Orthis crenistria.
O. filiaria.

It would be easy to add to the foregoing lists; but I have been more anxious to give an exact account of the species found, whose locality is certain, than to give a larger list, with a less precise determination of locality. In the lists already given the precise position of each is certain, and this circumstance gives a value to the catalogue which it would not otherwise possess.

It is necessary, in conclusion, to say a few words on the geological age of the entire group and its subdivisions. The occurrence of such fossils as *Athyris concentrica*, *Athyris squamosa*, *Spirifer clathratus* (which I believe to be only a variety of the *Spirifer disjunctus*, or *S. Verneuilli*), is sufficient to determine the position of the limestone beds as belonging to the lower portion of the Carboniferous system. The plant beds are the Yellow Sandstone of Dr. Griffith, or the Upper Devonian of the Geological surveyors. One of Mr. Griffith's divisions is lithologically absent, viz., the Carboniferous slate; but it is represented palæontologically by the entire limestone group. It is not possible to identify, bed by bed, the series here described with any system of subdivision proposed for the lower Carboniferous system; but I think no person, considering the district fairly and fully, can avoid coming to the conclusion that any line drawn in it must be arbitrary, and particularly so one separating the lower portion as Devonian from the upper as Carboniferous, when not a single characteristic Devonian fossil has been

found in it, nor so far as I am aware, in any other part of Ireland.

Too much importance has been attached to systems and system-makers hitherto in Geology; and many of the controversies waged, respecting Silurian and Devonian groups, have had their origin, or, at least, owe their continuance, to a desire on the part of the controversialists to extend, beyond their due boundaries, merely local subdivisions and names. The group of rocks described in this notice is a continuous whole, and should be viewed as such. The plant beds, on which the difficulty of classification has principally turned, ought, in my opinion, to be classed with the Carboniferous system, as they contain forms of plants, such as Knorria, which are recognised in Germany and elsewhere as eminently characteristic of Carboniferous beds.

I have already pointed out what I conceive to be the relative positions of the Limestone groups, and the lower Limestone subdivisions of Kilkenny. I now append a Tabular View showing this relation; and add, in another column, the corresponding beds described by me as the lower Carboniferous beds of the Menai Straits:—

Comparative View of Lower Carboniferous Rocks in Wexford, Kilkenny, and Carnarvon.

Wexford.	Kilkenny.	Carnarvon.
Feet.	Feet.	Feet.
1. **Old Red Sandstone.** Conglomerates alternating with red sandstones, ... 1150		
	Lower Limestone.	
2. **Yellow Sandstone.** Alternating beds of red and white, or yellow sandstones, with red conglomerate, ... 382	1. Lower shales, alternating with sandstones, 450	1. Yellow sandstone with plant remains, alternating with crystalline limestone and red shale, ... 204
Lower Limestone.		
3. Lower Division. Arenaceous in lower beds, and shale partings in upper beds, . 851	2. Dark gray limestone, with shale beds and partings, ... 650	2. Nodular red and calpy brown limestones, highly fossiliferous, ... 390
4. Dolomite. Gray, splintery, and coarsely crystalline, dividing into rhombic fragments, ... 385	3. Lower Dolomite, . . 200	

Wexford.	Kilkenny.	Carnarvon.
Feet.	Feet.	Feet.
5. Upper Division. Alternating limestone and black shale, thinly bedded, . . . 981	4. Shaly, fossiliferous nodular limestone,. . 330	
	5. Upper dolomite and cherty limestone, . . 250	3. Pink crystalline limestone, with bands of chert,. 526
	6. **Middle Limestone,** Black marble,. 820	4. Red conglomerate and associated coarse limestones and sandstones, ... 450
	7. **Upper Limestone.** Thick-bedded, massive, crystalline, gray limestones, ... 1500	
		5. Red shales and marl beds of the coal-measures, ... 160
Total, ... 3749	Total, ... 4200	Total, ... 1730

The Society met on the 9th of April, 1856, on which occasion the following Paper was read.

THE IGNEOUS ROCKS OF THE BEREHAVEN DISTRICT. BY G. H. KINAHAN, ESQ., GEOLOGICAL SURVEY OF IRELAND.

These Rocks occur in three different geological formations, viz., Old Red Sandstone, Yellow Sandstone, and the Carboniferous Slate. In the Old Red Sandstone, where they are principally in the large mass of purple and green slates and shales which are situated near the junction with the Yellow Sandstone, they are all greenstones, with one or two exceptions. They appear in two distinct districts, to the north and south of the Allihies Mines. I shall begin by making a few remarks on the northern district.

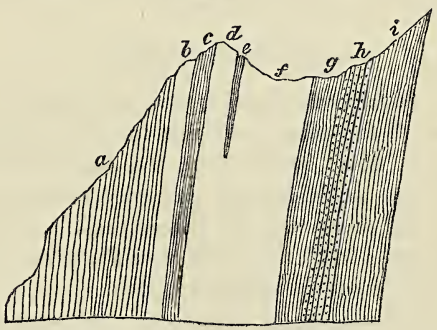
THE NORTHERN DISTRICT.

The principal part of the northern trap district is situated to the north-west of the Mines, and south-east of Cod Head, as the promontory to the north of Ballydonegan Bay is called, and stretches all along the north-west coast of Dursey Island out to Dursey Head. The igneous rocks here seem to be divisible into contemporaneous and

eruptive traps. The contemporaneous traps, the beds of which average generally about forty yards thick, are, for the most part, at least in their under portions, of a compact greenstone, with here and there veins of a light green colour, with small asbestos veins, and, in some places, minute crystals of asbestos disseminated through it. There are veins of quartz, compact and crystalline; also, thin flaky partings in the joints, of opal, of a greenish hue, besides crystals of iron and copper pyrites. The copper pyrites is only to be found among the asbestos; and, in some places, small distinct crystals of felspar and hornblende.

For about three or four feet of the upper part of the bed, it changes its nature, becoming very ashy, and full of small round pockets, about a quarter of an inch in diameter, of decomposed oxide of manganese; also crystals of iron pyrites. The Dursey Island trap seems to be a continuation of one of the Cod Head beds of trap, and appears to be confined to the north-west portion of the island; but about this it is hard to be certain, as the island for the most part is covered with drift and bog, and the coast section is the only place affording good data. The bed of trap at the eastern end is divided into two by a bed of altered slate, about four feet thick, which seems to die out, as it is not to be found as you follow the

Fig. 1.



a, Slaty grits.
b, Ashy greenstone.
c, Altered slate.
d, Greenstone.
e, Bed of altered slate.
f, Greenstone.
g, Purple slate.
h, Green grits.
i, Purple slate.

trap on to the west. The higher bed of trap lying on the top of the altered slate is very ashy, and resembles the highest portions of the beds on the mainland at Cod Head. The lower bed seems

to have been poured out at two distinct periods, as, on going further west, a small bed of altered slate is found in it, about one foot thick in the largest place, dying out after going about forty feet to the east; and at about thirty feet below the surface, as seen by the coast section (Fig. 1), which at that place cuts right through the beds, showing a magnificent transverse section; it is then traceable to the north side of Dursey Head, where it disappears in the sea.

The eruptive traps all spring from a large, irregular centre, with dykes running out on all sides,—some carry on for a good distance, but none of them are traceable for more than five hundred yards, while some do not exceed fifty, and generally end most abruptly. They seem to have been in action at a later period than the contemporaneous traps, as many of the beds with which they have come into proximity are twisted and contorted to a great degree. It would seem to have been the great boiler (if I may so call it) for one of the subsequent volcanic eruptions which took place in this neighbourhood. They are, for the most part of the same nature as the contemporaneous trap, but do not seem to have any ashy portion in them.

There is also a small greenstone dyke to the north of the Dooneen Mine, which seems to belong to this period; also a few small dykes in the mountains, to the south-east of the Mine Valley, which may be placed in the same classification.

THE SOUTHERN DISTRICT.

These traps (a pale, ashy-looking greenstone) have a most marked difference from all the others, and seem to have no connexion with them whatever. They range along the coast from Crow Head to about half-way to Cahirmore, generally running very small; the largest is not more than three feet thick, and most of them about one foot and a half, the small ones about nine inches; none of them seem to be contemporaneous; all nearly vertical, dipping to the north, and running in a direction for the most part E. 15 N.; they are not easily traced, on account of their small size, and the country being covered with drift and bog. They are to be seen to the best advantage on the north-west side of the Crow Head promontory. Going to the eastward toward Cahirmore, to the point to the east of Firkeel Bay, there is found a small oval mass of volcanic matter, of an ashy appearance. It seems to be contemporaneous, having the same stratification as the surrounding slate;

but that appearance is hard to be accounted for, as there is a number of ashy-looking dykes branching from it to the south-east and north-west. There is also a dyke to be found farther east along the coast; but it is not traceable all the way, on account of the drift, though it seems most likely to have had its origin at this spot, as also all the dykes at or near Crow Head. This has all the appearance of having been the vent of a small submarine volcano, as all the dykes which seem to be connected with it are of a very flaky nature, and such as one could imagine a volcanic ashy mud to become, on being consolidated. The slate underlying seems to be altered for the space of two or three feet.

There are also a few seemingly contemporaneous traps at Drumsharra Point, about 500 yards west of Pulleen Harbour, running about two feet thick; they do not seem to be very extensive, as they are not to be remarked anywhere else. One of them is a felstone porphyry, very like syenite in appearance; the other is very like a serpentine. They are close on the junction of the Old Red and Yellow Sandstone. There is also a felstone dyke to be found on the road leading from Dunboy to Pulleen, and another in Dunboy Wood; they are felstone, and lie in the direction of the bedding; but the beds on either side are slightly altered. These are the only felstone dykes that were found in the Old Red Sandstone formation.

YELLOW SANDSTONE.

The Yellow Sandstone in this district is not strongly developed, being only 700 or 800 feet thick; the principal igneous feature is a contemporaneous felstone, about 30 feet thick, traceable from the coast about 500 yards west of Drumsharra Point to the coast near Cahirmore, where the Yellow Sandstone disappears in the sea. It is to be traced all the way, with the exception of a few small breaks. It is a bluish felstone porphyry, with white felspar crystals very widely disseminated through the mass. It is displaced by two faults. There are also two or three small beds of felstone near Drumsharra Point, and one hornblende dyke; but none of them are of much consequence. On coming to Cahirmore you find a number of small greenstone dykes, which make their appearance there; and a roundish mass of trappean breccia, which seems to be contemporaneous, to which reference will be made at a future period.

CARBONIFEROUS SLATE.

This formation is very rich in igneous rocks; they make their appearance from about the centre of Bere Island, and carry on until the Carboniferous Slate is lost in the sea at Cahirmore. They appear principally in the grits called by Mr. Jukes Coomhola grits, from their being highly developed at Coomhola, near Glengariff. They lie lowest in the Carboniferous series, and are the principal representatives of it along the north side of Bantry Bay, in the Berehaven district,—there being very little Carboniferous slate proper developed therein. The traps at the Bere Island end will be first spoken of.

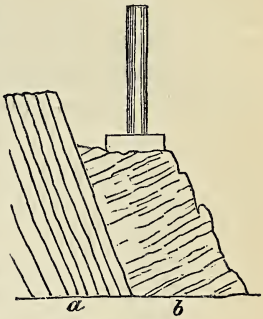
In Bere Island the igneous rock seems to be divisible into five classes,—conformable and unconformable greenstone, conformable and unconformable felstone, and felstone ash. The only legitimate beds of ash are felspathic, though most of the greenstone dykes have more or less of a flaky structure, resembling ash. The felstones for the most part are seemingly conformable,—the greenstones, not.

At the south-east of the island, under and near Tower No. 3, there is a system of conformable felstones, which seem to be contemporaneous, as the top of the beds are more or less ashy; and they generally become so before dying out. They are of a bluish colour, with a few crystals of white felspar widely disseminated through them. The blow-pipe has little or no action on them; no greenstone makes its appearance in this part of the island.

At the N. W. corner of the island, near Redoubt (No. 5), the trap all seems to lie conformable, being chiefly felstone, with one or two greenstones. These are traceable a short way to the east, where they are lost in the drift. A few of them can be traced as far as the Telegraph Tower; they do not go much further, if past it, as they are not to be found in the hill at the other side of the drift. Going further south, you find the strata and conformable trap cut up by a system of dykes; the traceable ones are ashy-looking or flaky greenstones; and along the coast are some small felstone, which, on account of their small size, are impossible to trace. The greenstones run every way; but the principal ones take a N. E. direction, and some of them run as far as the Telegraph Tower; they dip at an angle of 85° to the N. and N. E., and are on an average about $2\frac{1}{2}$ feet thick; some of them end in bosses of a com-

pact greenstone. Under the western light-house at Ardnakinna Point, there is a large felspathic trappean breccia, having a white felspathic base, enclosing pieces of altered slate, grit, &c., breaking into five or six dykes. At the western side there is a section (Fig. 2) seen on the cliffs, where it seems to be conformable; but it is not so on the east side, though the dykes, if not contemporaneous, run along the beds, as seen by the coast section. To the east of the light-house, going along the coast, you find conformable felstones which run in an easterly direction with the bedding of the surrounding grits and slates, but are cut up in two or three places by the greenstone dykes.

Fig. 2.



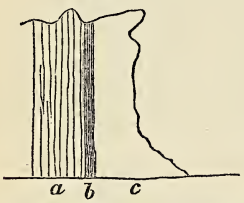
a, Slates and grits.
b, Trap.

At the farthest south side of the island there are two large felstone beds, with greenstone dykes running across them, which are seen in the grits and slate, but do not appear through the felstone, whose resistance seems to have been too great for them, they being raised and twisted in the places where the dykes ought to be.

There is a valley in the centre of the island due south of the Telegraph, which seems to have been the centre of action for the greenstones, as the felstones do not cross it, though they appear in the mountain that bounds it on the east. South-west of No. 4 Tower, in the valley, there is a large boss of greenstone, and innumerable small dykes, running mostly in a westerly direction. On the eastern side of the valley is a cliff full of small felstone traps, which seem to be conformable; also, one greenstone which begins at the cliff, as a hornblendic felstone; then changes into a beautiful porphyry, and then into a compact greenstone. All these beds die out or are lost in the drift. Due south of the valley there are principally felstones, with a few greenstones. To the west of that along the coast, the only place where the traps are seen, there are only felstones, a few of which are dykes; the rest are conformable,—some traps, others ash. The dykes run very small, none of them are over, and a few up to two feet in thickness; they are very compact, of a reddish hue, and sometimes very grit-like. Due south of the Telegraph along the coast are two masses of tabular, hornblendic felstone, with one or two greenstone dykes running through them. The felstone traps, all except a few of them, seem to have been contemporaneous with

the grit and slate, but, as the period went on, they become more hornblendic till you come to the uppermost bed on the south of the island, where they are hornblendic felstone, nearly approaching a greenstone. These are in some places conformable, in others not, as seen by the sections (Figs. 3, 4, 5, and 6, which are all sections taken at different places of the same mass of trap) at the junction with the grits and slates. They fused slightly with the blow-pipe. After

Fig. 3.



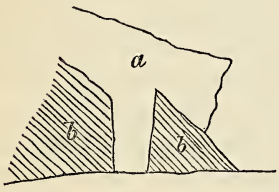
West end of Tabular Trap, looking east.

a, Slate. *b*, Altered slate. *c*, Felspathic greenstone.

Fig. 4.

a, Trap. *b*, Slate.

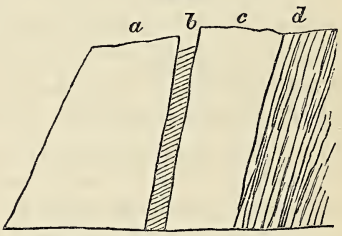
Fig. 5.



Looking east; Slate dipping west.

a, Trap. *b*, Slate.

Fig. 6.



Further east, looking west.

a and *c*, Trap. *b*, Slate. *d*, Slate.

this period the greenstone dykes seem to have been formed. The greenstones are a much darker green than those in the Old Red Sandstone at Cod Head and the Dursey; the dykes are very ashy-looking, or flaky, but generally have here and there through them compact portions, or end in a compact boss. The conformable felstones are either bluish or white, with crystals of felspar widely disseminated through them. The ashes have also crystals of felspar, but none of them become a regular porphyry, as seen in the Kerry traps. The age of the felstone dykes is hard to be fixed, as they only appear on the coast, and in no place were they found in contact with the greenstone dykes.

We shall now go to the mainland, and begin, as we did on Bere Island, by remarking the lowest beds. Just at the junction of the Yellow Sandstone and Carboniferous slate, there is a large massive bed, about 80 feet thick, of green, compact felstone, traceable from the extreme south of the Dunboy Wood to near Pulleen Harbour. It is twice broken by small, white felstone dykes (about ten feet thick). The first you meet, going from the east, causes a downthrow of about 200 feet; the second cuts it off, and after that it is not to be found; though there is a bed, which seems to have the same mineralogical appearances, to be found on the N. W. of Black Ball Head; but that lies much higher in the geological series. At Fair Head, and along the coasts N. E. and W., are to be found beds of felspathic trap, and ash and greenstone dykes. The felstone traps are very well developed a little south of the last-mentioned bed, making their appearance as beds; but, on going more south to Fair Head, becoming tabular. The greenstones are mostly small. All of these traps are very like those on Bere Island. Going now to the west of Drumsharra Point—as here the Carboniferous slate is all denuded away to make Pulleen Harbour—we come on a large, well-developed igneous district, full of dykes and beds; but we find them very like Bere Island, felspathic near the Yellow Sandstone, and, as you go higher in the series, becoming more or less hornblendic, being sometimes conformable and unconformable, as shown by sections, like those before mentioned when speaking of Bere Island,—the whole of it cut up in some places by greenstone dykes. We shall leave it, and go west to Black Ball and White Ball Heads. On the N. W. of Black Ball Head there is a large, irregular mass of trappean breccia, a greenish-brown, earthy base, with partially rounded crystals of hornblende, often two inches across, and veins of asbestos; outside this, a breccia of fragments of trap, slate, grits, primary limestone, and other kinds of rock. On White Ball Head there are to be found four dykes of breccia, very like that first mentioned, running in a N. W. direction, bearing direct for the breccia, before spoken of among the Yellow Sandstone traps, which breccia is very like the outer breccia on Black Ball Head. The breccia on Black Ball Head would appear to have been the vent of eruption of a submarine volcano, and the dykes on White Ball Head, and the mass on the mainland, part of the funnel thereof. The Black Ball breccia appears to have been contemporaneous with the mass of

slate, and there must have been an aqueous force in action at the time of its formation, as the mass is blended in with the surrounding slate, coarse near the centre, and getting finer as it recedes therefrom. Out of it there proceed a number of dykes, most of them felspathic, but a few hornblendic, which are partially intrusive at their origin; but they seem, at a little distance from it, to run evenly between the beds. At the north of White Ball Head there are two very crystalline greenstone dykes, which are not traceable far; also at the point there is a thin bed, about two feet thick, of trappean breccia running for about 300 yards, and then changing into a slaty grit. It would seem that just at this period the volcano made a slight movement, and that the aqueous power had spread its *debris* over the bed of the ocean. To the north of the breccia on Black Ball Head there is a system of dykes close together, one of which is very like the green compact felstone mentioned before, near Dunboy.

Under the Black Ball Tower there is a large mass of greenstone, quite different from any other of the greenstones found in the Carboniferous rocks of the district: in the first place it is contemporaneous; it lies a good deal higher in the series, being up among the black slate; and it is compact, very like the dykes found in the Old Red at Cod Head, only that it has not the light green patches with asbestos in them. It seems to have been poured out at two distinct periods,—as at the east side there is a small bed of green and black slate, about nine inches wide, which runs through the mass under the Tower. This finishes the trap in the Berehaven district.

The Society met on the 14th of May, 1856, on which occasion the following Paper was read.

ON THE PROBABLE EXISTENCE OF FOSSILS IN THE LIMESTONE OF CULDAFF, COUNTY OF DONEGAL. BY PATRICK GANLY.

From the data supplied by the publication of Mr. Griffith's Geological Map, it may be easily shown that the slate group composing the valley of the Foyle is the newest portion of the primary series in the north of Ireland; but it would appear from observation, that, although connected with our oldest sedimentary deposits by a conformable sequence, these strata agree in lithological aspect rather with the base of the Silurian System, as in Wicklow and Wexford, than with the more prevailing rocks of the primary series in Galway, Mayo, and Donegal, and generally consist of black, shining clay-slate, frequently alternating with white quartzite, and occasionally with gray crystalline and compact limestone.

The limestone, however, is chiefly confined to the base of the group, and attains its greatest development in the neighbourhood of Culdaff, where, though much disturbed by extensive protrusions of greenstone, it presents a succession of beds fully four hundred feet in thickness, remarkable for the greater part in containing an abundance of symmetrical concretions disseminated through the rock, in the manner of fossils, amongst more recent strata.

The concretions are usually found isolated, and of different forms, but those of most frequent occurrence are somewhat semi-globular, and vary in size from two inches to a foot in their greatest dimension. On the principal fracture they always exhibit a radiated structure, and after more detailed examination appear to be composed of a mass of truncated pyramids, terminating on the base or outer surface in a network of irregular polygons, which seldom exceed one-third of an inch in diameter.

Whether the specimens be compact or crystalline, their internal structure is still the same; and in relation to the strata in which they occur, it is not observable that the sedimentary lines of the bedding pass in any case through the enclosed concretions, nor that the radiating jointage of the latter ever extends into the surrounding rock; so that, taken as integral masses, these concretions would seem to be of anterior origin to the beds in which they are found,

and cannot, therefore, be supposed the result of mere metamorphic action induced at a subsequent period.

Under those circumstances, and in the absence of a better hypothesis, I think the concretionary structures in question may be rationally regarded as organic remains, in which the specific characters have been obliterated, and as probably referable to some genus of zoophytes, composed of adhering tubes, of which we have familiar examples in *Halysites catenulatus*, *Favosites Gothlandica*, and *Lithostrotion striatum*.

This conclusion, with respect to the semi-globular masses, is by no means invalidated by reference to others of a different kind, for these in many cases occur as small compressed cylinders, about two inches in length, and of nearly half an inch in diameter, suggesting the idea of Encrinite stems, or of broken Orthoceratites; and in one particular instance a concretion was found, almost identical with both valves of an ordinary Productus.

Thus, the observed facts, whether taken collectively or in detail, would appear all and each to indicate the probable existence of fossils in the limestone of Culdaff; and I have to hope that sufficient has been stated to induce further attention on the part of geologists to the rocks of the primary series.

The Society met on the 11th of June, 1856, on which occasion the following Papers were read.

OBSERVATIONS ON THE STRUCTURE OF STRATA. BY PATRICK GANLY.

1. *Succession of Laminæ.*

On the assumption that loose matter, accumulated by the action of water, assumes a chronological arrangement, geologists are enabled to establish the relative ages of a series of sedimentary rocks from their order of superposition, which may in general be easily determined by observation, so long as the strata lie level, or at low inclinations to the horizon; but becomes a question of considerable difficulty when they stand nearly vertical, or happen to be altogether turned over.

To ascertain the true succession in cases of this kind, will sometimes require a good deal of technical artifice, such as tracing out

the doubtful strata by their strike, to a less disturbed locality, a reference to lithological character and organic remains, or even to the original structure of the rock itself, should the ripple-mark or drifted ridges be well exhibited in the bedding.

By the last of these methods the sequence of the strata is deduced from the relation of their component laminæ, either on the principle that the layers are attenuated from the top towards the bottom, or that newer groups rest unconformably upon older ones. And that such is very constantly the fact, may be shown by observing that in the ripple-mark formed on the bed of a river, the matter eroded from each of the furrows becomes stratified on the sheltered side of the next adjacent down-stream ridge, and that during the transfer the coarser particles remain hindmost and uppermost, sloping at a steep inclination, whilst the finer portions are carried forward to a lower position, and lie nearly level. Under this process the drifted matter deposited will evidently thin out along the surface of repose, from the summit to the base; and as its profile will form a curved layer differently inclined to the horizon at different points, it is presumable that, in the progress of accumulation, the lower or level parts of newer masses will generally rest upon the upper or highly inclined edges of older groups, and thus give rise to frequent unconformabilities.

In illustration of these views, a few sketches are subjoined from observation.

Fig. 1.

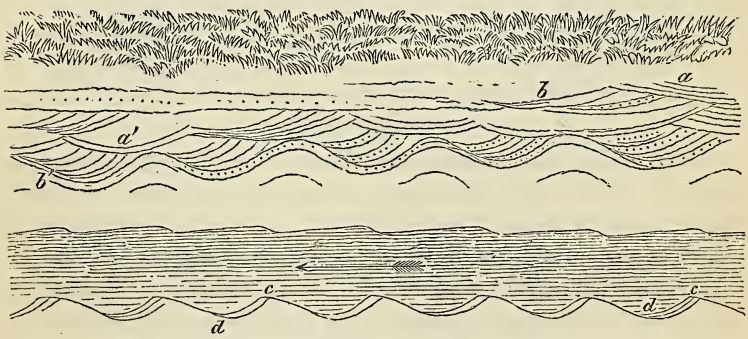


Fig. 1 is a section from the valley of a river about two miles north of Carndonagh, in the county of Donegal. In the lower

part, the river with the ripple-mark on its bed is represented. The arrow indicates the direction of the current, and sedimentary layers, thinning out from the top towards the bottom, are shown on the sheltered side of each of the ridges *c*, *d*. A few feet above the level of the river, in the adjacent bank, a laminated deposit of sand and clay is exposed, which also exhibits the ripple-mark, and appears to be the result of the river's action at a former period. In some parts the laminæ are homogeneous sediment, and are, therefore, of uniform thickness; but in general the layers are composed of partly fine and partly coarse materials, and present an attenuated profile from the crest of the ridge downwards, in a sloping direction, as at *b*, *b'*. Several examples of unconformable succession are likewise visible, caused by the embedding of the newer upon the older laminæ, as at *a*, *a'*.

Fig. 2.

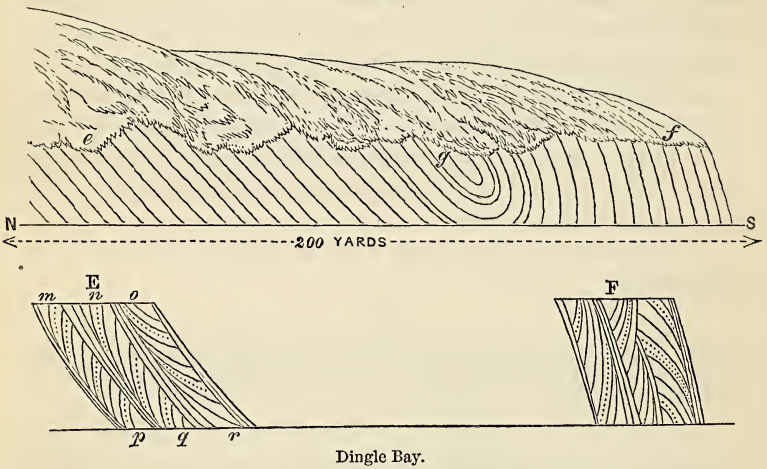


Fig. 2 is a section from the Silurian rocks of the county of Kerry, which occurs on the north shore of Dingle Bay, at Coosnagloor, near the southern base of Mount Eagle, and is here introduced as affording an application of the foregoing principles to practice. In this locality all the strata dip in the same direction, namely, to the south, and might be mistaken for an entirely ascending series; but by reference to their sedimentary structure at *e* and *f*, a synclinal convolution was indicated for the first time, and afterwards proved to exist by a careful examination of the bedding. Enlargements of

the lamination at these points are given at E and F, from which it will be seen, either on the principle of *attenuation* or *unconformability* of the layers, that the strata at E are in their natural position; but that those at F have been overthrown to the northward. This section is about 200 yards in length; for the whole of Fig. 1, the scale is about two inches to the foot; and in both cases the aspect is westward.

ON THE TRAPPEAN ROCKS IN THE NEIGHBOURHOOD OF KILLARNEY. BY MR. FREDERICK FOOT.

In the course of my duties on the Geological Survey in the vicinity of Killarney, I met with a large extent of trappean rocks, and as their existence in this locality is not generally known, I consider them well worthy of notice. The most westerly point where I observed these rocks was a deep and picturesque glen, situated about four miles and a half south-east of Killarney, called the Horse's Glen. It lies between the mountains Mangerton and Stoompa.

The form of the glen is remarkable, being that of an L reversed (⅃),—the lower limb turning towards the west instead of the east. In its north and south portions are situated two lakes, Lough Garagarry on the north, and Lough Managh on the south. The distance from the north end of the former to the south end of the latter is about one mile and a half. At the southern end of Lough Managh the glen turns at right angles to the west, and at the western extremity is another lake called Lough Errogh. The sides of the glen are steep and precipitous, proceeding southwards from Lough Garagarry. The trap rocks are seen on both sides of the glen, lying conformably between the beds of grit and slate, which are at the top and bottom of the cliff, that is to say, they overlie the beds at the bottom of the cliff, near the level of the lake, and are overlain by the beds at the top. When you first enter the glen at the west side of Lough Garagarry, the grits and slates appear to be nearly vertical, or dip south at 85°, but, proceeding southward, they roll to the south at low angles from 10° to 30°. Lines resembling stratification appear in places in the trap, conforming to the bedding of the grits and slates. On the west side of Lough Managh, where there are several

contortions in beds of purple grit and slate, the trap is seen plainly overlying them, conformably, and similarly contorted. Its general character is that of a pale bluish-green felstone, having in places concretionary nodules, but it varies from this to a compact green or purplish gray felstone, having a few scattered crystals of felspar. It is in some places highly porphyritic. The beds at and near the junction with the grits and slates are almost invariably ashy beds, varying from a dark green to a pale yellowish-green flaky ash, generally porphyritic. Some beds of dark-green decomposed ash extend from the southern end of Lough Managh, as far as a point opposite the middle of the north shore of Lough Errogh, and are then seen no more. They appear to dip south at 20°. On the western side of the glen, to the north of Lough Managh, is seen a dyke-like mass of hard, dark-green felstone, cutting across beds of green grit, which dip S. 45° E. at 55°. Its direction in plan is N.W. and S.E. Higher up on the cliff it is seen resting on beds of dark-gray, gritty-looking ash. Several long fissures are seen on both sides of the glen, resembling the walls of dykes, the dykes themselves having weathered away.

On the northern slope of Stoompa, three-quarters of a mile east of the south end of Lough Garagarry, is an isolated patch of trap, consisting of a green flaky felstone ash (with crystals of felspar) apparently dipping S. at 80°. Its relative position to the adjacent sedimentary rock is not discernible.

The mountains Eskduff, Benaunmore, and Crohane, lying to the east of Stoompa, and south and south-east of Lough Guitane, are chiefly composed of felstone. Between Eskduff and Benaunmore is a picturesque valley, about one mile in length, through which the Cappagh stream runs north and south into Lough Guitane. On entering this valley from the north side, at about one-eighth of a mile south of a small lake called Lough Nabrean, the trap is seen appearing on the west side. Its relative position with the adjacent sedimentary rocks is not plainly seen, but it has the appearance of resting conformably upon them, the dip being S. at 60°.

It extends westward to a point about one-fourth of a mile from the isolated patch before mentioned, on the north slope of Stoompa; where it ends, there seems to be a fault bearing N. W. and S. E., inasmuch as purple grits and slates strike abruptly against it. No

lines of stratification are clearly seen in the trap. It varies in character from a hard, granular, green, flaky felstone, in places ashy and porphyritic, to a green ash.

Near the summit of Eskduff Mountain, the trap forms high and precipitous cliffs, and a little south of the summit, lines like bedding, dipping south, are seen in it.

In places the grits and slates appear extending into the trap, which rests conformably upon them, the boundary between the two being deeply indented, in consequence of the sharp flexures into which they are thrown. At the south end of the valley the stream turns abruptly towards the west, so as to give this glen the same form as the Horse's Glen. The trap ends at the stream, dipping south, and none being seen to the south of it. The southern slope of the mountain towards the Horse's Glen is covered with heather; and no rock is visible further than about half-way between the summits of Eskduff and Stoompa.

On the east side of the Cappagh Valley, the mountain Benaunmore is one mass of felstone, in which lines like stratification are seen in places, dipping south at 40° generally. The trap varies from a dark-green compact felstone to a green porphyritic ash. In some places it is traversed by joints which give it a columnar or prismatic structure. This structure is finely exhibited on the eastern side of Benaunmore, where there is a remarkable ravine or cleft in the mountain, running N. W. and S. E., which is most likely a line of fault. The columns are seen on the east side of this ravine for a distance of about three-quarters of a mile. Where first seen at the north end of the ravine, they incline to the south at an angle of 50° or 60°; but further south they become vertical; some of them are fully 200 feet in height. They are generally irregular five or six-sided prisms, and are composed of dark-green compact felstone. The remarkable appearance that these columns give to the mountain scenery in this place renders it well worthy of a visit, even from an ordinary observer. In some places dykes are seen cutting across the columns, formed of white or pink compact felstone. This ravine terminates at a little mountain lake, called Lough Nabroda, the columnar structure ending about half-way on the west side of the lake. The trap on the eastern side of the ravine is different from that on the west. The columns are seen in places, but are not so extensive or massive. The trap on the east side extends further

south of Lough Nabroda than on the west, which is caused by the before-mentioned fault. Where it ends, the grit and slate rocks apparently rest conformably upon it, the dip being S. E. at 50°. Eastward from this, the line of junction is not plainly seen; but it evidently coincides with the strike of the grits, which is W. 30° S., and E. 30° N. A bed of light-green ash lies between the trap and grits; the trap ends abruptly a little N.W. of a small mountain lake called Foiladuane Lake; but the ash bed is traceable further, till apparently cut off by another large fault bearing nearly N. and S., and passing just W. of Foiladuane Lake. Just N. W. of Foiladuane Lake are two singular square-shaped masses, composed either of ash or of soft cleaved trap, with a band of slate and grit between them, dipping at 50°, and cut off on each side by faults, no trap of any kind appearing beyond them.

"Between the range of trap just described, and the summit of Crohane Mountain, the rocks are thrown into a bold synclinal curve, which brings in the trap, again dipping north, and forming all the upper part of Crohane. This trap of Crohane is apparently an isolated basin of trap, with a mass of slate and grit resting in the hollow of it, on the northern slope of the mountain, running through Lough Athovynastooka; both sides of the basin ending abruptly a little east of that lake, probably cut off by a great N. W. and S. E. fault. A very well-marked fault, a continuation of that from Foiladuane Lake, cuts through the middle of this trap, where the little mountain track runs up the north slope of Crohane, from the Glenflesk Valley. A bed of green, flaky ash rests upon all the trap of Crohane, with red and green grit reposing on it, and sometimes alternating with it, the two rocks occasionally forming a breccia."—*From Mr. Jukes' Notes.*

On the south side of Crohane the trap is generally a greenish, porphyritic felstone, having in places white concretionary nodules, varying in size from a nut to a turkey-egg; these nodules being very numerous near the summit.

In some places it is a hard, compact, brownish felstone, with crystals of felspar; and there are several beds of dark-green ash. There are a few instances of the columnar structure here also. A dyke of pinkish felstone cuts N. W. and S. E. through part of the anticlinal, on the S. E. slope of Crohane.

Another large trappean mass occurs at Glenflesk, at a distance

of about ten miles from Killarney, on the east and north side of the road leading from Killarney to Macroom. Close to the road, at the boundary of the townlands of Carrigaree and Killeen, is a large mass of trap rock, of an ashy nature, having crystals of felspar in a green base. Beds of greenish-gray grit dipping east at 20° seem to come out from beneath; the bedding of the trap is not clear. The cleavage is distinct, dipping S. 15° E. at 70°. A dyke of pale-greenish felstone cuts through it, bearing in plan N. E. and S. W.; a little northwards the trap changes in character, varying from a green ash, with ferruginous crystals of felspar, to a strong porphyry, with large, irregular crystals of felspar in it. The ash beds here have much the appearance of serpentine. Eastward of the road, and nearly parallel to it, runs a deep gorge, which is apparently a line of fault, giving a displacement of about 150 feet. Green and purple grits and slates on the east, striking against the trap on the west. At the southern end of this gorge, on the western side, is a dyke of pale-green felstone, running nearly east and west. On the side of the hill, north-east of the gorge, the trap is dark, green, and flaky, having a hornblendic appearance, and fuses easily in the reducing flame of the blow-pipe. The line of junction of the trap and grit rocks runs on the west side of, and nearly parallel to, the boundary between the townlands of Carrigaree and Killeen. There is no well-marked junction; but the boundary between the trap and grits seems to coincide with the strike of the latter. Going northwards along this boundary, the trap is generally a bluish-green, granular felstone, in one or two places traversed by joints, which give it a columnar structure. At the north side of the townland of Carrigaree, the trap runs east and west into the sedimentary rock, apparently resting in a contortion of the latter. Eastward from the point, at the road where the trap was first mentioned, and on the southern slope of the hill, is a large outlier of purple slates, green, gritty, micaceous flags, and strong green grits, dipping S. 45° E. at from 0° to 35°, resting on the trap; and S. E. of this the same beds appear overlying the trap, which seems to be similarly bedded. Proceeding N. E., the hill which slopes towards the Clydagh River is all trap, varying from a bluish-green to a dark, reddish-brown compact felstone, with pink flakes. In some places near the edge of the river, the wavy structure is well seen on the surface.

South of Clydagh Bridge, the line of junction between the trap

and grit runs nearly east and west; the latter dips south, at from 20° to 30°, and rests conformably on the trap, about one mile east of Clydagh Bridge; in the bed of the river another junction is seen, but the bedding of the rocks is not clear.

The trap is not seen any further to the east. It extends to the north as far as Rodgers' Rock, which is about one mile due south of the western summit of the Paps; here it appears to be bedded nearly horizontal.

It preserves the character of either brown or green compact felstone, with pink flakes. South-west of Rodgers' Rock, the mountain is covered with heather, the trap being seen only here and there in irregular masses.

The length of this mass of trap, from the place first described near the road, to Rodgers' Rock, in a straight line, is nearly three miles.

NOTE TO MR. FOOT'S PAPER, BY MR. J. BEETE JUKES.

The felstone traps discovered by Mr. Foot in the green and purple grits and slates, forming the lower part of the Old Red Sandstone near Killarney, perfectly resemble, in every lithological character, those to be seen in the lower Silurian rocks of Wales, and the S. E. of Ireland. The same may be said of those found by Mr. Kinahan in the upper Old Red Sandstone and Carboniferous Slate near Castleton, Berehaven, where, however, they are associated with greenstones, which are almost, if not entirely, absent near Killarney.

The principal varieties of felstone near Killarney are the following:—

1. The most abundant, a smooth, compact, siliceo-felspathic paste, generally of a pale-greenish or bluish-gray colour, very slightly translucent at the edges. This is the character of the columnar portion of the trap. It is frequently marked, though not in the columnar part, both externally and internally, by fine wavy lines or striæ, of slightly different shades of tint from the mass, often greatly curved or twisted; these remind one of the striæ to be seen in a slag from an iron furnace, as they vary solely in colour, and not in texture. There is no further separation of particles in this variety beyond the appearance of a little shining facet of a crystal of felspar, to be occasionally discerned on turning about a fresh fracture variously to the light. The nodular, concretionary structure men-

tioned by Mr. Foot, is exactly like that to be seen in similar felstone in the neighbourhood of Penmachno (North Wales). The nodules are compact, not different from the mass of the rock, although easily separable from it.

2. A granular crystalline variety, in which the mass is composed of small crystals of felspar, and here and there of little crystalline particles of quartz. The crystalline particles of quartz frequently assume a perfectly rounded and amygdaloidal form, as if they had been crystallized in small pores or vesicles that had been produced in the mass; but they likewise occur in irregular crystalline forms, entangled among the crystals of felspar.

In these two varieties the overplus of silica originally contained in the fused mass, beyond that necessary to form trisilicates with the alumina, potash, or soda, or whatever other bases the rock may contain, has either remained mechanically mixed in the paste of the general mass, or has crystallized out, as it could on the formation of the felspar crystals.

3. The third variety is a bluish-gray felstone porphyry, with numerous crystals of white or pale flesh-coloured felspar, often as much as one-eighth or even one-fourth of an inch across. Crystalline portions of quartz may occasionally be seen also in this.

In some parts of this rock the crystals of felspar, although exhibiting its characteristic cleavage and lustre, have yet a rounded outline, either oval or almost circular. These must either have been formed in vesicular cavities, like the quartz mentioned above, or else the rock must be an altered "ash," and the felspar crystals have suffered from mechanical attrition before they were deposited in the mass. The ashy appearance of this rock is in some cases increased by its flaky character, but this is in many places perceptible where the flakes do not split parallel to the *bedding* of the adjacent slates, but to their *cleavage*, even when that is very different from the bedding. It looked as if the trap rock were affected by a concealed cleavage, which partial decomposition or weathering *brought out*, and gave the rock its flaky character.

4. A fourth variety of the trap, generally found in its upper portion only, was an undoubted "ash," a perfectly fine-grained, soft, flaky rock, smooth, with rather a soapy feel; easily ground to powder; of a pale greenish tint; translucent at the edges, its powder being nearly white.

Wherever a good surface of the lower part of the felstone is exposed, whatever variety it may consist of, it is almost invariably marked by strong rough lines, which stand out in relief on the weathered surfaces, and run parallel to the lower boundary of the trap, and to the stratification of the grits and slates below. These lines or bands, sometimes half an inch or more across, look exactly like the harder bands of a gritstone that project on a weathered surface. On breaking open the trap, there is no apparent internal structure to correspond with them. I believe they are what the Germans call "streckung." They are often seen in the felstones of Arenig and other parts of North Wales.

The main mass of the Killarney trap is, as described by Mr. Foot, interstratified with and conformable to the sedimentary rocks, and partakes of all their accidents of contortion and dislocation. Some parts of it cannot be less than 600 feet thick, and may be much more; but other parts are not more than half that thickness. It is probable, though by no means certain, that the mass forming Benaunmore, where the great columnar ranges are, is the central nucleus or focus from which these igneous rocks originally spread.

In conclusion, I would only add my testimony to that of Mr. Foot, as to the exceeding interest attached to a visit to these trap rocks, both for their geology and for the wild and picturesque beauty of the glens and valleys, on the sides of which they are to be seen, and which are more rarely visited by tourists than they deserve to be. The view from the summit of Crohane (2162 feet), down, on to the craggy top of Benaunmore, with its two parallel glens, and its ranges of columnar cliffs, across the wild and rugged district of Old Red Sandstone round the head of the Kenmare Valley, to Hungry Hill and Dursey Island on the left, and along the Killarney Mountains to Dingle Bay and Brandon Mountain on the right, over the limestone flat on which rests Lough Lean and Castlemaine—and on turning round along the mountain axis of Old Red Sandstone hills, between the flat country of South Cork, composed of the Carboniferous slate, and the equally flat land of North Cork and Kerry, consisting of coal-measures,—to the distant heights of the Galtees, and where the Old Red again rises from beneath,—is one of the most beautiful and most instructive in the neighbourhood of Killarney.

THE Society met on the 14th May, 1856, on which occasion the following Paper was read.

ON THE GEOLOGY OF THE CHINCHAS ISLANDS, PERU, SOUTH AMERICA.

BY JOHN ROBERT KINAHAN, M. B. T. C. D.

THE district about to be described consists of three islands situated in the South Pacific Ocean, about twelve miles from Pisco, on the coast of Peru, in lat. 13° 44′ S.; long. 76° 13′ W.

Though small in size, the largest island probably not being more than three miles round, they are and have been for some time the seat of a busy commerce, as they abound in guano; and it was whilst taking in a cargo of this commodity that opportunity was afforded me for obtaining the materials for these notes. The islands are three in number, and surrounded by several large detached rocks. They go by the names of North, Middle, and South Islands.

In their physical characters there is a strong resemblance between them; high precipitous cliffs for three-fourths of their circumference; the rest of their coast line, low cliffs and a few sandy coves,—these latter having more or less complete reefs of rocks crossing their entrance—the beach, wherever it does exist, being a coarse shingle.

The cliffs in the North and Middle Islands are highest at the north-west end of the islands, where it gradually slopes away southward and eastward; the coves already mentioned generally being to the eastward.

In the Middle Island the rock appears to rise gradually from the north, and finally culminates the guano as a conspicuous white rock.

The surface of the North Island, as far as can be seen, is slightly depressed in the centre, having the level broken by rounded prominences.

Narrow channels separate the islands, and are of from a quarter to nearly a mile in width, their depth varying from $2\frac{1}{2}$ to 30 fathoms, the bottom either rock, sand and shells, or gravel. That between the North and South Islands is becoming altered in its characters every day, owing to the enormous quantity of ballast thrown overboard there; but the channel between the Middle and South Islands remains yet unchanged. Owing to the direction of these two islands, it is much narrower and more sheltered than the other; in consequence, the shores on this side of the Middle Island are nearly all

sandy. On the day on which it was most particularly examined, the Paraca was blowing fiercely outside, and yet this channel was nearly as calm as a mill-pond. Its depth varies from 2 to 7 fathoms, and in many places, even in the centre of the channel, there is no more than 6 fathoms. The bottom is either fine white sand, small gravel, or rocks ; in one part the rock can be traced continuous across the channel.

The rock of the island is a porphyritic granite, intersected by numerous veins and dykes of serpentine trap, varying from 2 inches to as many feet in thickness; greenstone protrusions, some of them of considerable extent, also occur.

The granite is in part broken up by a system of parallel joints, so as to appear like beds, and exhibit evidence of a great disturbing force, being twisted and contorted in various parts ; the overlying systems often being unconformable with those beneath, the one set running horizontally, the other curving over them in a strange manner.

The greenstone protrusions are best seen on the shores of the bays, generally overlying the granite, and associated with a coarse sandstone grit.

The trap occurs through all the islands; in the Middle Island in very large veins,—the cliffs on the south side of this island being almost altogether composed of it, in enormous square masses piled one on top of the other; the dykes here also run horizontally, the granite both underlying and overlying it.

Owing to the peculiar formation of the granite, the sea has much effect on it, and all the cliffs and detached rocks around the islands are more or less hollowed out into caves, some of them extremely picturesque, and many communicating with each other, and thus forming fine bridges. In one of these bridges, in a detached rock off the Middle Island, the abutments of the bridge are formed externally of granite, while the arch and inner part of the abutments are trap with squared joints, which in the distance might well be taken for a bridge artificially formed.

Many traces of recent upheaval of these islands are to be found on them, evidences of a raised sea-beach being nearly universal; even the cliffs 200 feet high are capped with a layer of large rolled pebbles of trap and granite cemented together ; this layer of conglomerate varying from one to several feet in thickness, and traces of it being

found also in the central depressed portions of the island. Beds of coarse gravel grit and of an argillaceous sandstone also occur, and decisive evidence of its marine nature is afforded in a rather extensive bed of fossilized shell breccia, which may be seen on the south-west side of the North Island.

On examination, this latter locality gives the following section:—

Commencing above, immediately beneath the guano, which is here of a very dark colour, and an average depth of six inches, we meet a bed of dark argillaceous sandstone; next, a bed of coarse sandstone grit passing into a shell breccia, the breccia varying in thickness from 1 to 4 feet, and composed of numerous Balani, part broken, part quite perfect, and many in position, all unrolled, preserving their natural sharpness, so that their identification is quite easy. They closely approach *Balanus tintinnabulum*, which species is dredged in the adjoining seas, and in abundance covers the rocks and base of the cliffs beneath, but they do not appear to be quite identical with this species. Along with the Balani are found single valves and broken shells of an Ostrea (this mollusc is not now, as far as can be judged, found here), and a few scattered spines of apparently a Cidaris, the whole cemented together into a very compact mass.

Next, a belt of very fine friable grit, intersected by white veins of anhydrous sulphate of lime, which passes gradually into a very fine argillaceous sandstone, of greenish-gray colour and compact texture, also intersected by the sulphate of lime veins, and in parts deeply stained with iron. In some places this latter bed overlies the shell breccia, and appears to be a continuation of the bed of dark sandstone immediately underlying the guano. These sandstone beds reappear on the other side of the island, and are probably continuous under the guano. Beneath the sandstone lies the usual granite of the island. Not far from the locality described, a thick bed of very coarse conglomerate, apparently identical with that found on the summits of the cliffs elsewhere, separated the granite from the green sandstone; the shell breccia bed is also much thicker.

The greenish-gray sandstone crumbles much under the influence of the weather, the veins of white sulphate of lime, in that case, protruding as thin ledges, in some parts some inches wide. The shell breccia extends along the face of the cliff for some hundred yards in length, but I had no means of ascertaining its extent inland. In many places along this side of the island an ammoniacal incrus-

tation has run down over the face of the cliff; it has evidently drained from the guano above, and has also infiltrated the whole of the upper portion of the rocks, rendering the identification of them very puzzling. Through the kindness of Professor Haughton, I am enabled to lay before you an analysis of the white veins which penetrate the sandstone:—

	Per Cent.
Water,	4·80
Silica,	1·74
Alumina,	1·80
Sulphate of Lime,	90·74
	99·08

Though scarcely within the scope of such a paper as this, as being of much more recent origin, it will be hardly proper to pass over the guano beds unnoticed. Their structure is easily seen here, and is as follows:—Conical ridges, in one case attaining the height of 200 feet, regularly stratified; the strata of various thicknesses, not following the lie of the subjacent rock; the strata of one hill cropping out at the sides, originally, apparently, continuous with those of another, and running horizontally; but I have entered so fully into this subject elsewhere (Journal of the Royal Dublin Society, vol. i. p. 89), that further structural description were superfluous. These beds rest either on the porphyritic granite, the sandstone grit, green sandstone, or coarse conglomerate; when the latter, the lower beds of the guano is filled with boulders, which, though quite hard and rounded when exposed, soon crumble away, and become filled with cracks containing crystals of carbonate of ammonia. Lumps of carbonate of ammonia and of a mixed carbonate and phosphate of ammonia occur, the former as angular broken pieces, the latter as botryoidal rounded nodules in regular pockets in the guano.

The Middle Island does not call for particular description; the masses of trap, as already stated, are much larger here, composing the entire cliffs on the eastern side of the island. The island runs about N. E. and S. W. On the South Island the cliffs around are more continuous than in either of the other islands, and there is but one sandy bay, situated on the east: this, a great number of rocks renders absolutely inaccessible. The channel which separates it and the Middle Island is, as already stated, sheltered; the coast of the South Island here is precipitous, with a broad shingle beach at its base. Access

to the top is obtained by clambering up the face of a steep rock, and over a very fine natural bridge. Close to the landing-place there is a narrow gulley in the rocks, through which a great mass of ammoniacal incrustation has run and spread itself over the whole face of the cliff; it has also concreted in the gulley, nearly completely filling it up with a stalagmite-form mass, resembling a frozen cascade. The origin of this is rather obscure. The whole of the cliff here is capped with the coarse trap and granite conglomerate, beneath which a small bed of very fine yellow sandstone (not met with elsewhere on the island) occurs; this is exceedingly limited in its extent, and lies on the granite; the coarse gravel grit takes its place a little higher up the hill: no traces of the shell breccia are found. The other geological characters of the island are similar to those of the north island. The greenstone protrusions are larger in extent, and the granite, especially the cliffs on the western side of the island, exhibit that curious unconformability between its upper and lower portions already mentioned; on this side the granite might at a distance be easily mistaken for a stratified rock, the surface of the rock being curved down towards the water's edge, its section exhibiting a system of joints which accurately follow the line of the curve above.

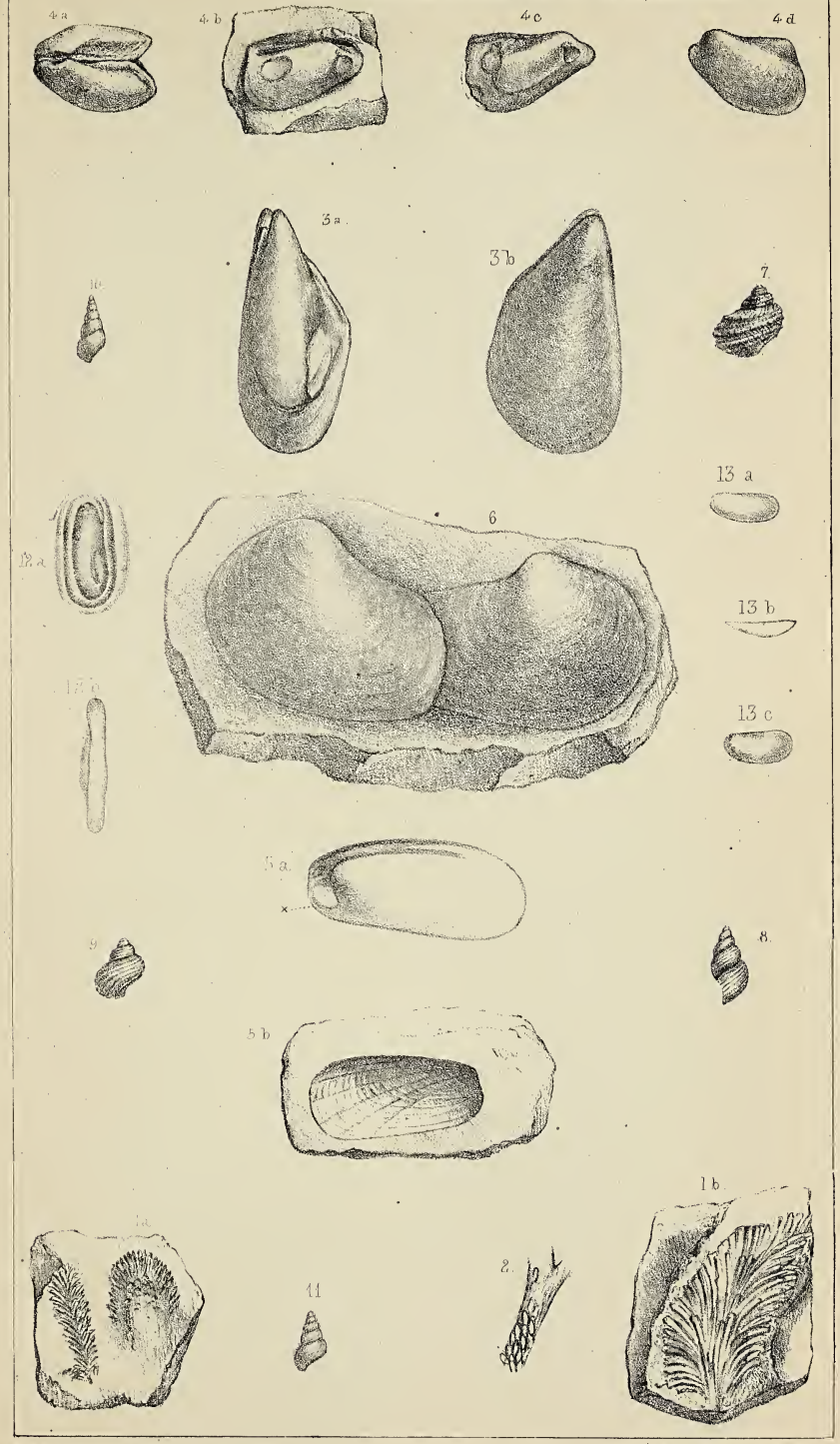
The only sandy bay in it occurs on the eastern side, and is decidedly the best place for studying the greenstone, a square protrusion of considerable size occurring here. The south side of the cove is ordinary granite, which gradually passes into the greenstone; the junction of the two on the north side cannot be traced, owing to a large bed of fine sandstone grit which fills up the valley between them. The sea is evidently encroaching on this bed of grit, and it appears different in its external characters from the beds described in the North Island, and also in the fact of its not resting on the coarse conglomerate. There is a small bed of similar character in one of the coves looking south-east on the North Island, which is there also associated with the greenstone.

The guano rests on the grit. The hill here is excessively curious, its summit covered with remains of sea-lions (*Otaria jubata*) in scores. This island had not been worked when I visited it; therefore, I can say nothing concerning its surface. The trap is not so abundant in this island, the greenstone apparently taking its place; the summits of some of the highest cliffs are capped with greenstone.

These are the principal observations I was enabled to make re-

garding these curious islands. Their chief interest appears to be in connexion with the observations already made by Darwin on raised sea-beaches in Chili and Peru. If I might venture to speculate, these beaches are much older than those met with at Callao, as the shells met with, subfossils, at the latter place are still to be found recent there, and those met with here, though closely approaching the recent species, are not absolutely identical. I cannot conclude without returning thanks to Captain John Steevens, of the ship Rienzi, for the many facilities he afforded me while making an examination of these islands; and also must apologize to the Society for my presumption in coming before them with a communication in reference to a science (geology) in which I am altogether unlearned,—which fact will be, I hope, taken as an excuse for any technical blunders the eyes of the initiated may herein detect.

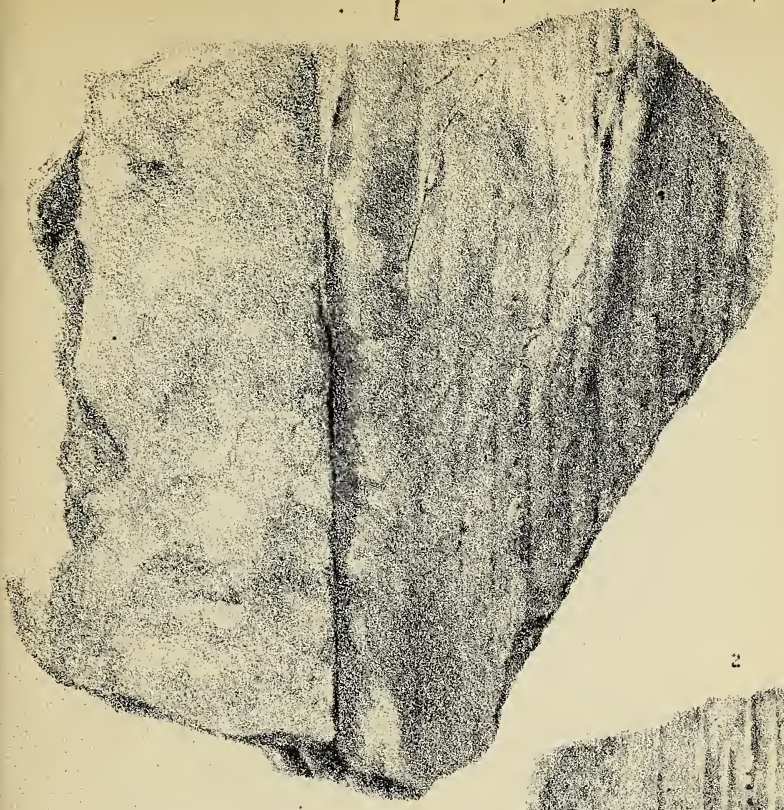
Dec. 13, 1859.



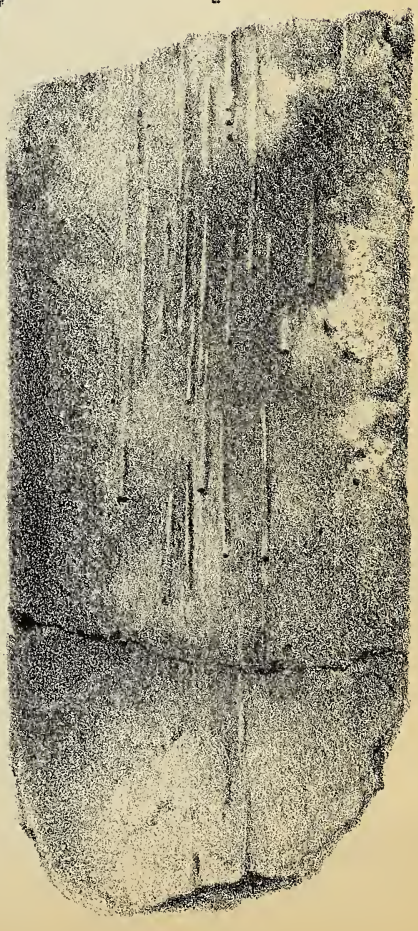
W. King, Jun.r del. W. H. Baily, lith.

Printed by Hullmandel & Walton.

1

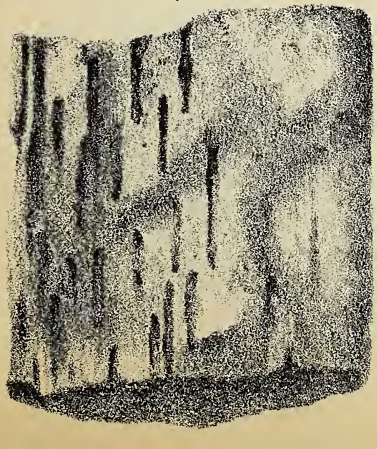


2



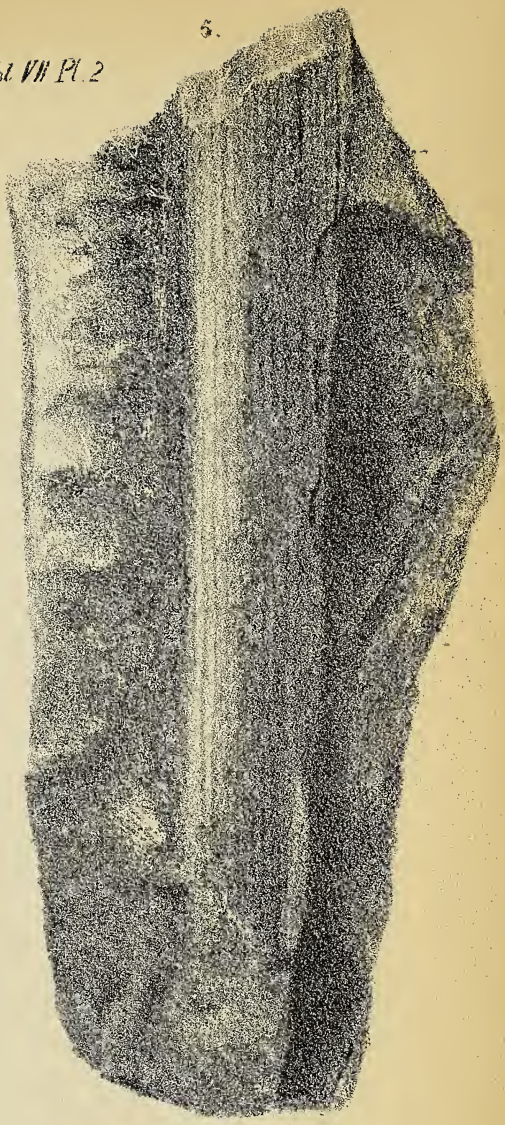
3.

4



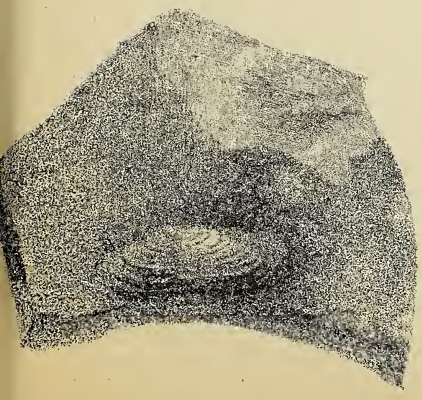
Journal of the Geological Society of Dublin Vol VII Pl. 2

5.



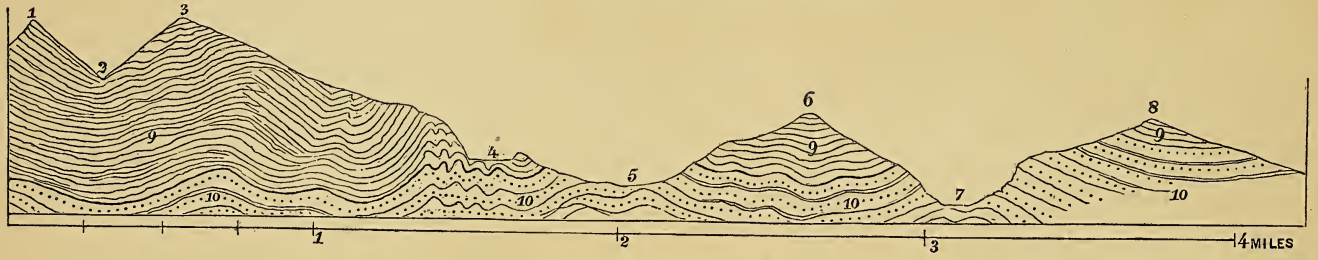
6.

8



7

Section from Carrantwohill on the N. W., to Knocknabreda on the S. E., Co. Kerry.—To illustrate Mr. G. V. Du Noyer's Paper "On the Geology of the Lake District of Killarney."



Scale for height and distance the same.

No. 1. Benkeeragh Mount, 3314 feet.
2. Lough Cummeenoughter, 2338 feet.
3. Carrantwohill Mount, 3414 feet.
4. Carraghmore Lake, 1004 feet.
5. Carraghmore Glen.
6. East flank of Sugarloaf Mount.

No. 7. Black Valley at Lough Reagh.
8. Knocknabreda Mount, 1811 feet.
9. Middle Subdivision of the Old Red Sandstone. Purple Grits and Slates, with a few Conglomeritic Layers in the upper portion. Jasper Pebbles not uncommon.

No. 10. Lower Subdivision of the Old Red Sandstone. Greenish-gray and Green Chloritic Grits and Slates, with bands of Purple Slate. The Grits often finely conglomeritic, containing Pebbles of Jasper.

LIST OF

Scientific Periodicals, Transactions of Societies, &c.,

Received since the July Number went to press.

GREAT BRITAIN.

I. Zoologist. A Popular Monthly Magazine of Natural History. Published monthly. London. J. Van Voorst. (Received regularly.)

II. Phytologist. A Botanical Journal New series. Published monthly. London. W. Pamplin. (Not received since April, 1856.)

III. Hooker's Journal of Botany. Published monthly. London. Lovell Reeve. (Received regularly.)

IV. Naturalist. A Popular Monthly Magazine of Natural History. London. Groombridge and Son. (Received regularly.)

V. Liverpool Natural History and Philosophical Society, Journal of. Published annually. (Received up to 1855.)

VI. Edinburgh New Philosophical Journal. New Series. Published quarterly. Edinburgh. F. and C. Black. (July, 1856, not received.)

VII. Dublin Quarterly Journal of Medical and the Collateral Sciences. Published quarterly. Dublin. Hodges, Smith, and Co. (Received regularly.)

VIII. Journal of the Royal Society of Dublin. Published quarterly. Dublin. Hodges, Smith, and Co. (Received regularly.)

FOREIGN.

IX. Jahrbuch der K. K. Geologischen Reichsanstalt. Bd. I.—V., 1850-1854. Bd. VI., Nro. I.—III., 1855.

X. Verhandlungen des zoologisch-botanischen Vereins in Wien. Bd. I., 1852; Bd. III.—V., 1853-1855. Festkranz desselben; 1853.

XI. Bericht ueber die oesterreichische Literatur der Zoologie, Botanie, und Palæontologie, aus den Jahren 1850-1853. 1855.

XII. Lotos, Zeitschrift fuer Naturwissenschaften. Jahrgang VI., Nro. I.—IV., Januar bis April, 1856.

XIII. Wuerttembergische naturwissenschaftliche Jahreshefte. Jahrgang XII., Heft I., II., 1856.

XIV. Jahrbuecher des Vereins fuer Naturkunde im Herzogthum Nassau. Heft X., 1855.

XV. Allgemeine deutsche naturhistorische Zeitung, der Gesellschaft Isis in Dresden, neue Folge. Bd. I., 1855; Bd. II. Hft. I.-VI., 1856.

XVI. Verhandlungen des naturhistorischen Vereines der Preussischen Rheinlande und Westphalens. Jahrgang XII., 1855; Jrg. XIII. Hft I., 1856.

XVII. Neueste Schriften der naturforschenden Gesellschaft in Danzig. Bd. I., II. (zum Theil) 1820 u.s.w.; Bd. III., Hft. 1II., IV., 1840, 1842; Bd. IV., 1843-1851; Bd. V., Hft. I.-III., 1853, 1855.

XVIII. Programm der oeffentlichen Pruefung der Petri-schule zu Danzig. 1856.

XIX. Archiv fuer wissenschaftliche Kunde von Russland. Bd. XIV., 1854-1855; Bd. XV., Heft I., II., 1856.

XX. Bulletin de l'Academie Royale des Sciences etc., de Belgique. Tome XXIII., No. I.-VII., 1856.

XXI. Memoires de la Société Imperiale des Sciences, etc., de Lille; Seconde Série. Vol. I., 1855; Vol. II., 1856.

CORRESPONDENCE.

Angenommen ist mit Vergnuegen der Tausch der Schriften, so wie es die Loebliche Redaction der Zeitschrift fuer Entomologie, zu Breslau, vorgeschlagen hat.

KIRBY AND SPENCE'S ENTOMOLOGY.

SEVENTH AND CHEAPER EDITION.

Just published, in One closely printed Volume, of 600 pages, crown 8vo. Price 5s. Cloth.

INTRODUCTION to ENTOMOLOGY; or, Elements of the Natural History of Insects. Comprising an Account of Noxious and Useful Insects; of their Metamorphoses, Food, Stratagems, Societies, Motions, Hybernation, Instinct, &c. By WILLIAM KIRBY, M.A., F.R.S., F.L.S., Rector of Barham; and WILLIAM SPENCE, Esq., F.R.S., F.L.S. *Seventh Edition*, with an Appendix relative to the Origin and Progress of the Work.

*** This work is now published at one-sixth of the price of the sixth edition, so as to bring it within reach of all desirous of becoming acquainted with the Natural History of Insects, and thus carrying out more effectually the object of the authors—that of introducing others to a branch of science which they had found so delightful. Though compressed by a smaller type into one volume, it contains every line of the sixth edition, which included much new matter not in the five preceding editions; and, to render the work more complete, the account of its origin and progress, furnished by Mr. Spence to the Life of Mr. Kirby by Mr. Freeman, is, with his permission, given as an Appendix.

London: LONGMAN, BROWN, GREEN, and LONGMANS.

CONCHOLOGY AND GEOLOGY.

MR. R. DAMON,

OF WEYMOUTH, DORSET,

INVITES ATTENTION TO HIS EXTENSIVE STOCK OF

SHELLS AND GEOLOGICAL SPECIMENS.

BRITISH SHELLS—named Collections, of 100 Species, 52s. 6d.—200 ditto, £6 6s.—300 ditto, £12 12s.—400 ditto, £25—Elementary Collection of 50 Species (100 Shells), 15s.—List of British Shells, 8d.—Complete Set of Labels for British hhells, neatly printed, 2s. 6d.

FOREIGN SHELLS—Generic and Typical Collections adapted for Museums—Elementary Collection of 100 Species, 30s.—Ditto, 1,000 Species, £50—Land and Fresh Water Shells of Europe—Marine ditto of the North Seas—Mediterranean, &c., &c.

FOSSILS, including Saurian Remains—Pentacrinites—Fish—Ophiuræ—Ammonites, Shells, &c., &c.—Geological Collections illustrative of the Oolitic and Lias Beds, £1 and upwards—Suite of the Tertiary Fossils of the Paris Basin, 200 Species, named, 5 Guineas.

Ready in a few days,

Volume III., for 1856, of the

NATURAL HISTORY REVIEW,

NEATLY BOUND IN GREEN OR BLUE CLOTH, GILT,

CONTAINING Reviews of lately published works on Natural History; notices of Home and Foreign Serial Publications, and the transactions for 1855-56 of the Dublin Geological Society, Dublin Natural History Society, and Dublin University Zoological Association.

pp. 450.—With eleven Lithographs and numerous Woodcuts.

London: WILLIAMS AND NORGATE. Dublin: HODGES, SMITH, AND CO. Edinburgh: WILLIAMS AND NORGATE.

Price Twelve Shillings.

30 4327

SMITHSONIAN INSTITUTION LIBRARIES
3 9088 01314 3102